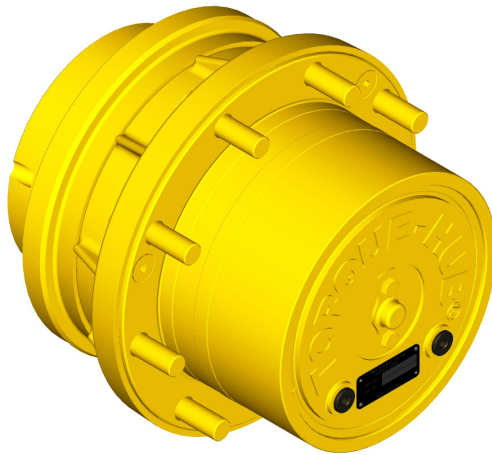
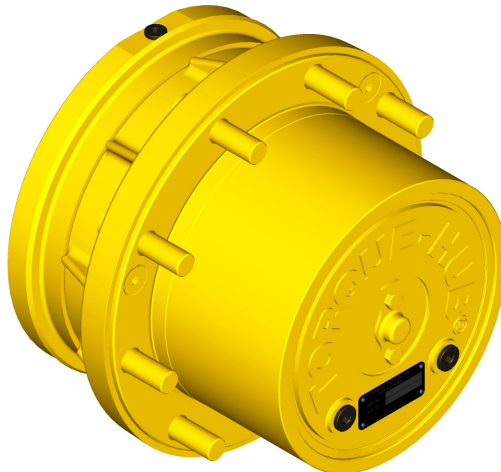




# **Torque-Hub<sup>®</sup> Planetary Final Drive 7000 Series Service Manual with Brakes**



7HP MODEL



7HB MODEL

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**Features and specifications are subject to change without notice.**

# Planetary Final Drive Service Manual

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# Planetary Final Drive Service Manual

## Introduction

This manual is a step-by-step guide to the disassembly and assembly of the 7HP and 7HB Torque-Hub® units. It is designed for the customer or mechanic who is repairing this particular Torque-Hub® model.

Users of this manual should note that each part mentioned is followed by an identification number enclosed in parentheses. These part numbers may be referred to in the Parts List and Assembly Drawing sections of this manual.

Specialized tools used to assemble this unit are noted in the assembly procedures and diagrammed in the Assembly Tools section.

Users should familiarize themselves with the procedures for roll and leak testing, as well as bolt tightening and torquing found on the following three pages before starting any repairs.

Standard safety practices should be followed during the disassembly and assembly procedures described. Safety glasses and safety shoes should be worn, and heavy, heat resistant gloves should be used when handling heated components. Be especially alert when you see the word **CAUTION**. This indicates that a particular operation could cause personal injury if not performed properly or if certain safety procedures are not followed. The word **NOTE** is used to bring attention to certain procedures or helpful hints that will aid in the disassembly and assembly process.



## Planetary Final Drive Service Manual

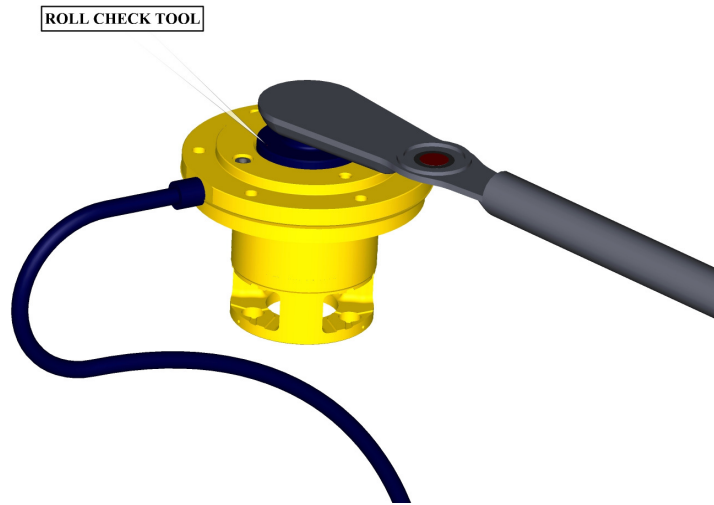
### Brake Test

#### The Brake Test

To perform a brake check, use a M12x1.5 metric fitting. Install a hydraulic hand pump with pressure gauge into brake port in spindle (1A) using metric thread fitting.

Place ROLL TEST Tool (refer to table on page 9) into input coupling.

Apply 25 in-lbs torque. While trying to rotate tool, pump the handle on the hydraulic hand pump and increase the pressure until the brake releases. The brake is released when you are able to rotate the tool.



Record the release pressure. If the brake does not release within limits shown in the brake chart on page 6, check to see if it has the proper number of springs using the **SPRING CHECKING PROCEDURE**. Increase to maximum pressure (refer to brake chart on page 6) and hold at that pressure for one minute. If the brake does not leak or lose pressure, the unit has passed the brake test. If the brake loses pressure, attempt to repair the leak using the leak repair procedure at end of this procedure.

While brake is still released, roll check the unit for one revolution of the output member by rotating the tool. Bleed off pressure slowly while rotating the ROLL TEST Tool.

Record the pressure at which the brake locks up. Using a clean rag, wipe off excess fluid from around the brake port and install the pipe plug.

Continued on Next Page

| BRAKE REFERENCE CHART -7HP                                       |                         |                         |                                  |                                  |                                      |                              |                             |
|--|-------------------------|-------------------------|----------------------------------|----------------------------------|--------------------------------------|------------------------------|-----------------------------|
| 4 <sup>th</sup> DIGIT<br>IN<br>MODEL<br>CODE<br>(INPUT<br>BRAKE) | BRAKE<br>PART<br>NUMBER | NUMBER<br>OF<br>SPRINGS | RELEASE<br>PRESSURE<br>MIN (psi) | RELEASE<br>PRESSURE<br>MAX (psi) | FULL<br>RELEASE<br>PRESSURE<br>(psi) | MAXIMUM<br>PRESSURE<br>(psi) | BRAKE<br>TORQUE<br>(in-lbs) |
| A  | AM902430F               | 14                      | 133                              | 193                              | 270                                  | 3000                         | 2155                        |
| E  | AM902430X               | 8                       | 77                               | 111                              | 154                                  | 3000                         | 1230                        |
| F  | AM902430X               | 14                      | 139                              | 199                              | 270                                  | 3000                         | 1399                        |
| G  | AM902430F               | 12                      | 120                              | 171                              | 232                                  | 3000                         | 1201                        |
| X  | No Brake                |                         |                                  |                                  |                                      |                              |                             |

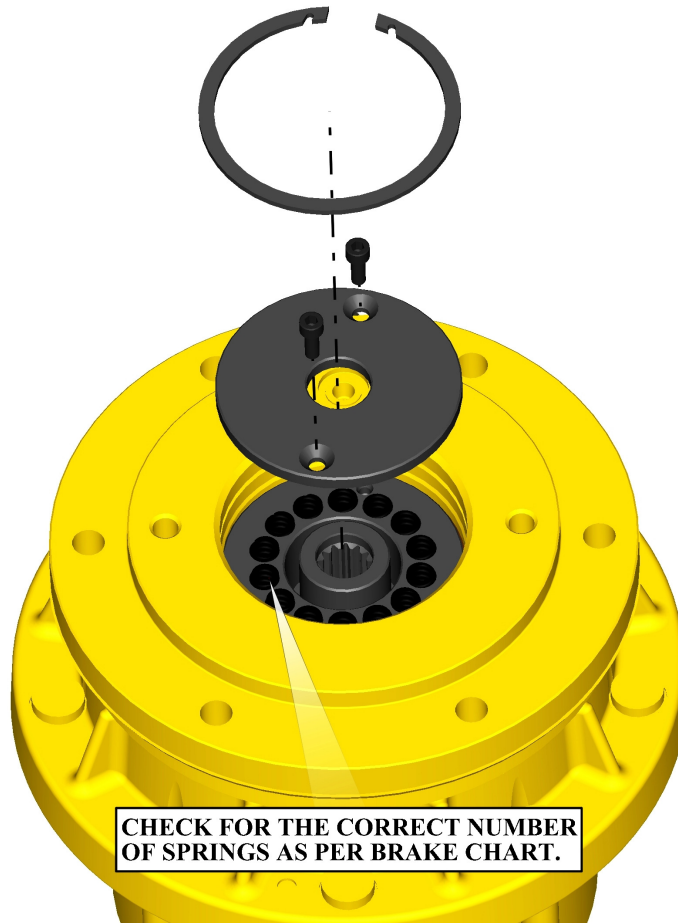
| BRAKE REFERENCE CHART -7HB                                       |                         |                         |                                  |                                  |                                      |                              |                             |
|--|-------------------------|-------------------------|----------------------------------|----------------------------------|--------------------------------------|------------------------------|-----------------------------|
| 4 <sup>th</sup> DIGIT<br>IN<br>MODEL<br>CODE<br>(INPUT<br>BRAKE) | BRAKE<br>PART<br>NUMBER | NUMBER<br>OF<br>SPRINGS | RELEASE<br>PRESSURE<br>MIN (psi) | RELEASE<br>PRESSURE<br>MAX (psi) | FULL<br>RELEASE<br>PRESSURE<br>(psi) | MAXIMUM<br>PRESSURE<br>(psi) | BRAKE<br>TORQUE<br>(in-lbs) |
| A  | AM902419A               | 14                      | 153                              | 227                              | 332                                  | 3000                         | 2032                        |
| B  | AM902419B               | 12                      | 132                              | 195                              | 284                                  | 3000                         | 1743                        |
| C  | AM902419C               | 10                      | 111                              | 164                              | 237                                  | 3000                         | 1452                        |
| D  | AM902419D               | 9                       | 100                              | 148                              | 213                                  | 3000                         | 1306                        |
| E  | AM902419E               | 8                       | 89                               | 131                              | 189                                  | 3000                         | 1159                        |
| X  | No Brake                |                         |                                  |                                  |                                      |                              |                             |

#### SPRING CHECKING PROCEDURE:

Install two bolts into holes in the brake piston. Tighten bolts in such a way to ensure the brake piston remains straight while being compressed into the brake cavity of the spindle.

Carefully remove the retaining ring from the spindle. Slowly remove bolts from the input brake. Remove the cover plate from the end of the input brake and count the number of springs in brake. If number of springs matches the number in the **BRAKE CHART**, go to the next step. If the number of springs does not match the number in the **BRAKE CHART** above, install the correct number of springs.

Continued on Next Page



Install the Brake Cover Plate using two bolts. Tighten bolts in such a way that to ensure the Brake Cover Plate remains straight while being compressed into the brake cavity of the spindle.

Install the large retaining ring into the groove in spindle (1A), making sure it is seated properly. Remove all remaining bolts from the brake piston and discard.

**NOTE:** USE CAUTION WHEN REMOVING BOLTS AS THEY ARE SUBJECT TO SPRING PRESSURE. MAKE SURE THE RETAINING RING IS SECURED BEFORE REMOVING BOLTS.

Re-test the input brake. If release and/or lockup pressures still do not match the brake chart, contact the Oerlikon Fairfield service department.

**BRAKE LEAK REPAIR PROCEDURE:**

Install two bolts into holes in the Brake Piston. Tighten bolts in such a way to ensure the Brake Cover Plate remains straight while being compressed into brake cavity of Spindle.

Carefully remove the Retaining Ring from the Spindle. Using two eyebolts threaded into opposite holes in the Brake Piston, remove the Brake Piston from the Spindle.

Check O-rings, Backup Rings, and brake cavity in Spindle for damage. If no damage is found, reinstall the Input Brake according to the Input Brake Installation Procedure in the assembly instructions chapter and perform pressure test again. If brake still leaks, contact the Oerlikon Fairfield service department.

Reference: Sample Model 7HP/7HB X\_\_\_\_\_. The 'X' is the brake option (Model Code). Consult Oerlikon Fairfield for other brake options.

**NOTE:** Failure to perform this test may result in damaged or ineffective brake parts.

## Planetary Final Drive Service Manual

### Roll and Leak Test

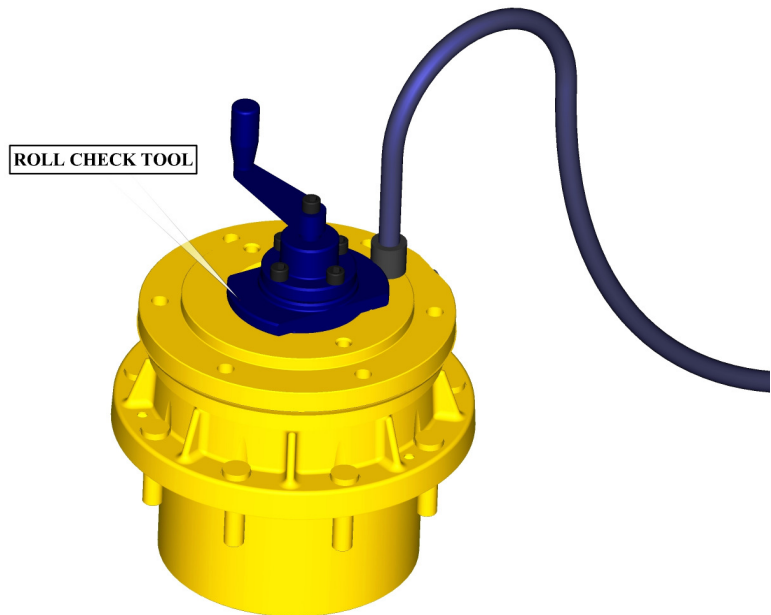
Torque-Hub® units should always be roll and leak tested before disassembly (if possible) and after assembly to make sure the unit's gears, bearings and seals are working properly. The following information briefly outlines what to look for when performing these tests.

**NOTE:** The brake must be released before performing the roll test. This can be accomplished by either pressurizing the brake using the Brake Leak Test procedure below or by tightening the bolts into the piston through the end plate (See Brake Disassembly Procedure).

**NOTE:** Bolts must be removed while performing brake release test.

#### The Roll Test

The purpose of the roll test is to determine if the unit's gears are rotating consistently, easily and properly. It should be able to rotate the gears in the unit applying constant force to the roll checker. If more drag is felt in the gears only at certain points, then the gears are not rolling consistently and easily and should be examined for improper installation or defects. Some gear packages roll with more difficulty than others. Do not be concerned if the gears in the unit seem to roll hard as long as they roll with consistency. Rotate the gearbox both clockwise and counterclockwise the same number of turns as the ratio of the unit. The gearbox ratio is the same number as the last three numbers on the ID tag.



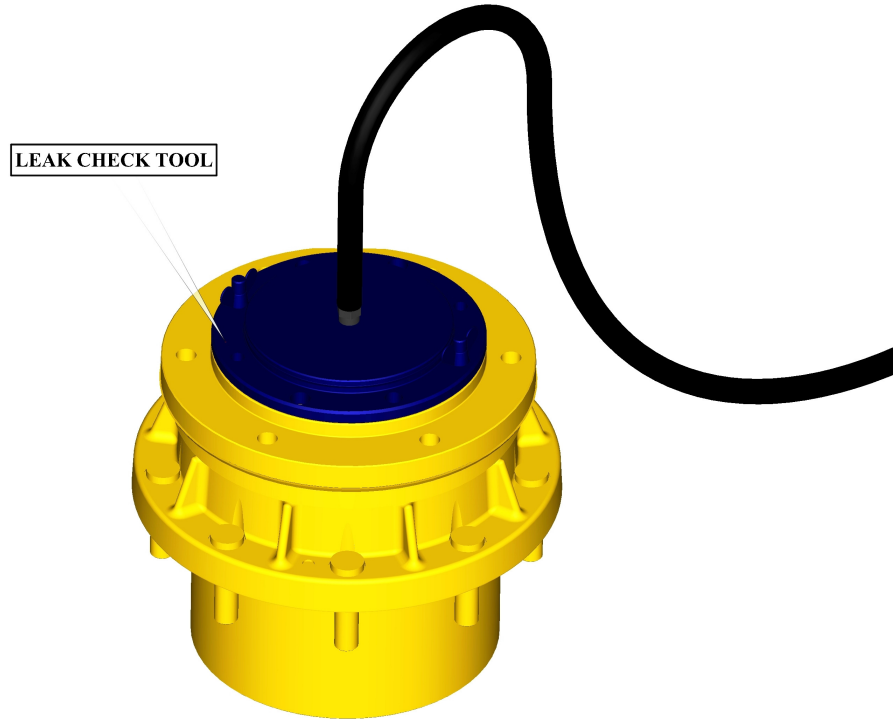
Continued on Next Page

| 7HP ROLL TEST  |                |
|----------------|----------------|
| Model Code     | Roll Test Tool |
| 7HPx01xZZ3xxxx | T195650        |
| 7HPx01xZZ8xxxx | T211706        |
| 7HPx02xZZ3xxxx | T195650        |
| 7HPx02xZZ8xxxx | T211706        |
| 7HPx03xZZ3xxxx | T195650        |
| 7HPx03xZZ8xxxx | T211706        |

| 7HB ROLL TEST  |                |
|----------------|----------------|
| Model Code     | Roll Test Tool |
| 7HBx01x0A3xxxx | T195650        |
| 7HBx01x0B2xxxx | T218542        |
| 7HBx01x0B3xxxx | T195650        |
| 7HBx01x0B8xxxx | T163056        |
| 7HBx03x0A3xxxx | T195650        |
| 7HBx03x0B2xxxx | T218542        |
| 7HBx03x0B3xxxx | T195650        |
| 7HBx03x0B8xxxx | T163056        |
| 7HBx04x0B8xxxx | T163056        |
| 7HBx04x0B8xxxx | T163056        |
| 7HBx04x0B8xxxx | T163056        |
| 7HBx04x0B8xxxx | T163056        |
| 7HBx04x0B8xxxx | T163056        |
| 7HBx06x0B8xxxx | T163056        |
| 7HBx06x0B8xxxx | T163056        |
| 7HBx06x0B8xxxx | T163056        |
| 7HBx06x0B8xxxx | T163056        |

## The Leak Test

The purpose of a leak test is to make sure the unit is airtight. The unit has a leak if the pressure gauge reading on your leak check fitting starts to fall after the gearbox has been pressurized and allowed to equalize. Leaks will most likely occur at the pipe plugs, the main seal or wherever o-rings or gaskets are located. The exact location of a leak can usually be detected by brushing a soap and water solution around the main seal and where the o-rings or gaskets meet on the exterior of the unit and then checking for air bubbles. If a leak is detected in a seal, o-ring or gasket, the part must be replaced and the unit rechecked. Leak test at 10 psi for 20 minutes.



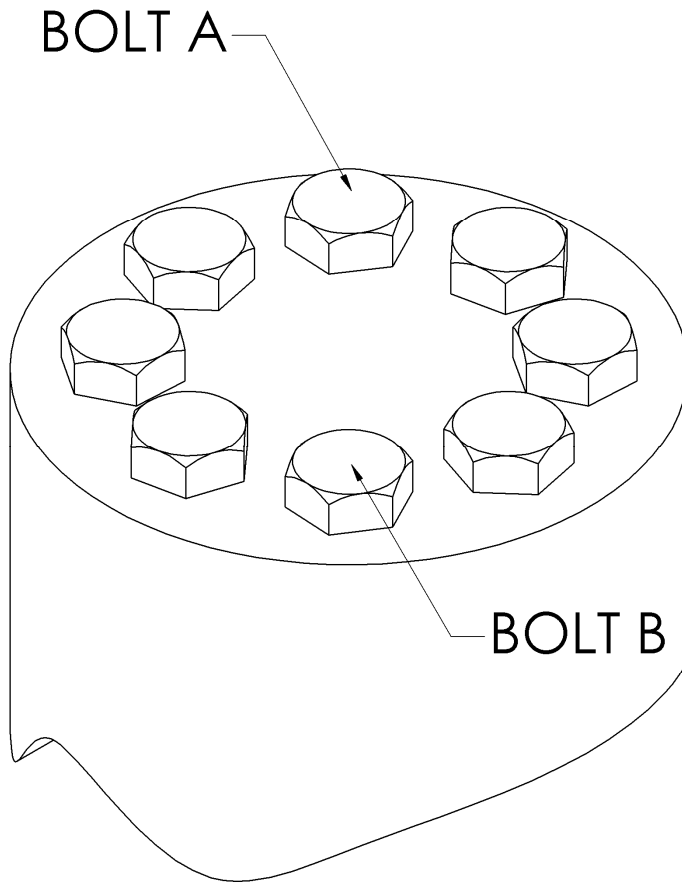
| 7HP LEAK TEST   |                |
|-----------------|----------------|
| Model Code      | Leak Test Tool |
| 7HPx01xxxxxxxxx | T210241        |
| 7HPx02xxxxxxxxx | T210241        |
| 7HPx03xxxxxxxxx | T210241        |

| 7HB LEAK TEST   |                |
|-----------------|----------------|
| Model Code      | Leak Test Tool |
| 7HBx01xxxxxxxxx | T219786        |
| 7HBx03xxxxxxxxx | T219786        |
| 7HBx04xxxxxxxxx | T219786        |
| 7HBx06xxxxxxxxx | T219786        |

## Planetary Final Drive Service Manual

### Tightening and Torquing Bolts

If an air impact wrench is used to tighten bolts, extreme care should be taken to ensure the bolts are not tightened beyond their specified torque. The following steps describe how to tighten and torque bolts or socket head cap screws in a bolt circle.



1. Tighten (but do not torque) bolt "A" until snug.
2. Go to the opposite side of the bolt circle and tighten bolt "B" until equally snug.
3. Crisscross around the bolt circle and tighten the remaining bolts.
4. Use a torque wrench to apply the specified torque to bolt "A."
5. Using the same sequence, crisscross around the bolt circle and apply an equal torque to the remaining bolts.



## Planetary Final Drive Service Manual

### Lubrication Information

#### General Properties

The lubricant used in most Torque-Hub® drives should be petroleum-based gear fluid containing anti-oxidation, anti-foaming and extreme pressure additives. The lubricant should have a minimum viscosity index of 95 cst and maintain a minimum viscosity of 40 cst under normal operating conditions. Some applications require special considerations; consult the machine manufacturer and Oerlikon Fairfield for more additional information.

The table below lists the recommended viscosities for various ambient operating temperatures. These recommendations are based on temperature rise of 50° to 100°F at normal operating conditions.

| Differential Planetary   |             |                       | Simple Planetary |                       |
|--|-------------|-----------------------|------------------|-----------------------|
| Ambient Temperature  | ISO Index   | AGMA Lubricant Number | ISO Index        | AGMA Lubricant Number |
| -40° to -5° F <sup>(1)</sup>   | VG100       | 3EP                   | VG100            | 3EP                   |
| -5° to 40° F   | VG150       | 4EP                   | VG100            | 3EP                   |
| 40° to 105° F  | VG220/VG320 | 5EP/6EP               | VG150/VG220      | 4EP/5EP               |
| 105° to 150° F <sup>(2)</sup>  | VG460       | 7EP                   | VG320            | 6EP                   |
| <b>Footnotes</b><br>1. For operation in this ambient temperature range, synthetic oil is recommended with a pour point of 10°F lower than the minimum ambient temperature.<br>2. For operation in this ambient temperature range, synthetic oil is recommended for proper lubricant life at elevated temperatures. |             |                       |                  |                       |

#### Maintenance

Oil amounts for each series of Torque-Hub® drives are indicated in the appropriate series literature. An initial oil change should be made after the first 50 hours of operation. Subsequent oil changes should be made at 1,000 hour intervals or annually, whichever comes first.

Oil temperatures should be not higher than 160° to 180°F for continuous operation, and no higher than 200°F for intermittent operation. For special applications, high horsepower, high speeds or wide temperature changes, please consult Oerlikon Fairfield.

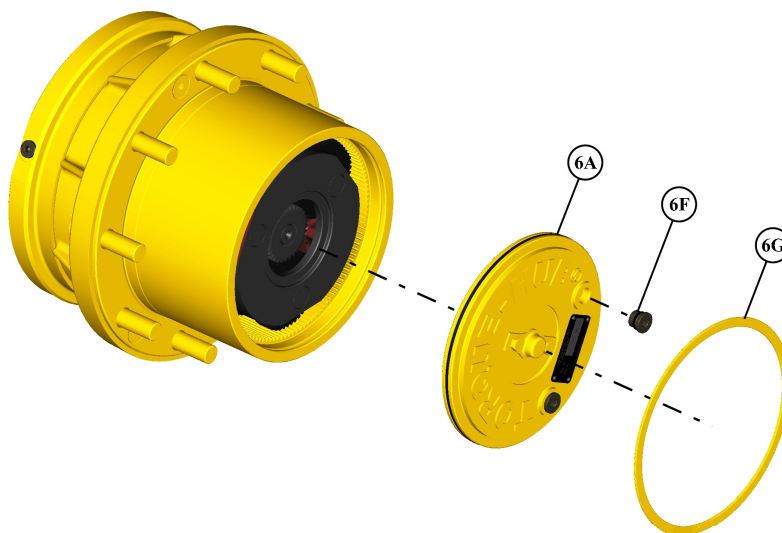
#### Oil Fill Level

When the Torque-Hub® unit is mounted horizontally, unless otherwise specified, the gearbox should be filled half-full of oil. Consult the appropriate series literature for approximate fill volumes. Vertically mounted Torque-Hub® units may require special lubrication procedures. Please contact Oerlikon Fairfield for vertically mounted applications.

# DISASSEMBLY

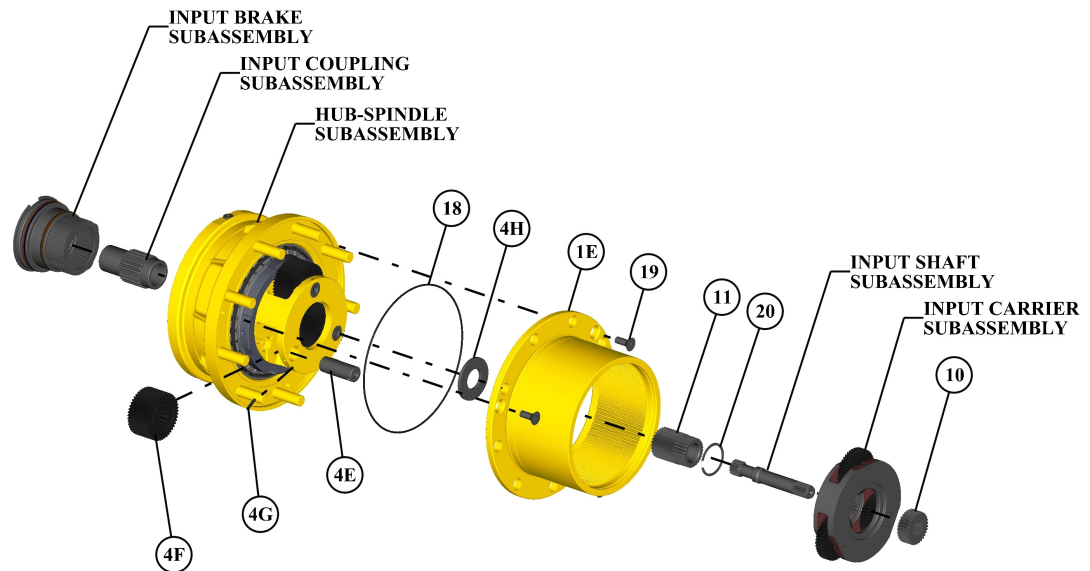
## Planetary Final Drive Service Manual

### Main Disassembly



1. Perform a roll check and leak check prior to disassembling the unit.
2. Remove the two magnetic Pipe Plugs (6F) and drain the oil out of the gearbox.  
**NOTE:** Record the condition and volume of the oil.
3. Remove Retaining Ring (6G) from the Cover Subassembly.
4. Lift the Cover Subassembly off the unit.

Continued on Next Page



#### 7HB DISASSEMBLY

#### Continued on Next Page

5. Remove the Input Sun Gear (10) if applicable.

**NOTE:** On units with a ratio of greater than 36:1, there will be no Input Sun Gear (10). The teeth will be integrated on the Input Shaft.

6. Lift out the Input Carrier Subassembly from Hub-Spindle Subassembly.

**NOTE:** Skip step 7 for 7HP Disassembly.

7. Remove the Input Shaft Subassembly out of the Hub-Spindle Subassembly.

**CAUTION:** Safety glasses must be worn during these next steps.

8. Remove the Retaining Ring (20) from the Second Stage Sun Gear (11).

9. Remove the Second Stage Sun Gear (11).

**NOTE:** On units with a ratio 48:1, the Sun Gear (11) and the Input Shaft (9) will need to be removed together.

10. Loosen and remove the three Flat Head Bolts (19) that retain the Ring Gear (1E) to the Housing (1G).

11. Lift the Ring Gear (1E) from Hub-Spindle Subassembly.

**NOTE:** Skip step below for 7HP Disassembly.

12. Remove the Thrust Washer (4H) from the counter bore in the Hub-Spindle Subassembly.

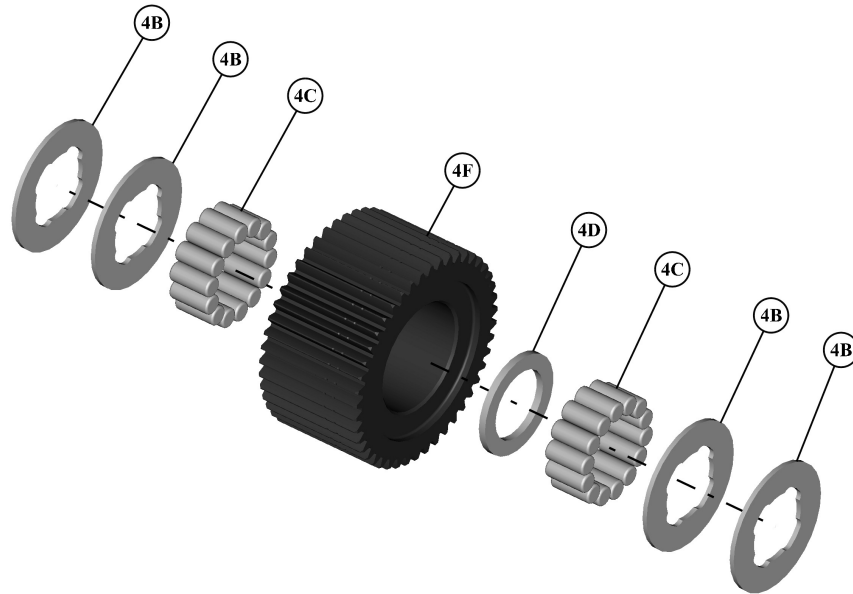
**NOTE:** Discard the O-ring in the step below. Do not re-use it.

13. Remove the O-ring (18) from between the Housing (1D) and the Ring Gear (1E).
14. Using a 1/8" diameter punch, drive the Roll Pin (4G) into the Planet Shaft (4E) until it bottoms against the Hub-Spindle Subassembly.
15. Grasp the Roll Pin (4G) using needle nosed pliers or some sort of hooked tool, and pull the Planet Shaft (4E) out of the Hub-Spindle Subassembly.
16. Using a 1/8" diameter punch, drive the Roll Pin (4G) out of the Planet Shaft (4E).  
**NOTE:** The Roll Pins (4G) should not be reused when reassembling the unit.
17. Slide the Planet Gear Subassembly (4F) out of the Hub-Spindle Subassembly being careful not to drop the Needle Bearings (4C) in the process.
18. Remove the Input Brake Subassembly from the Hub-Spindle Subassembly (Refer to page 23 for Input Brake Disassembly).
19. Remove the Input Coupling Subassembly from the Hub-Spindle Subassembly.

**This concludes the Main Disassembly.**

## Planetary Final Drive Service Manual

### Output Planet Gear Disassembly

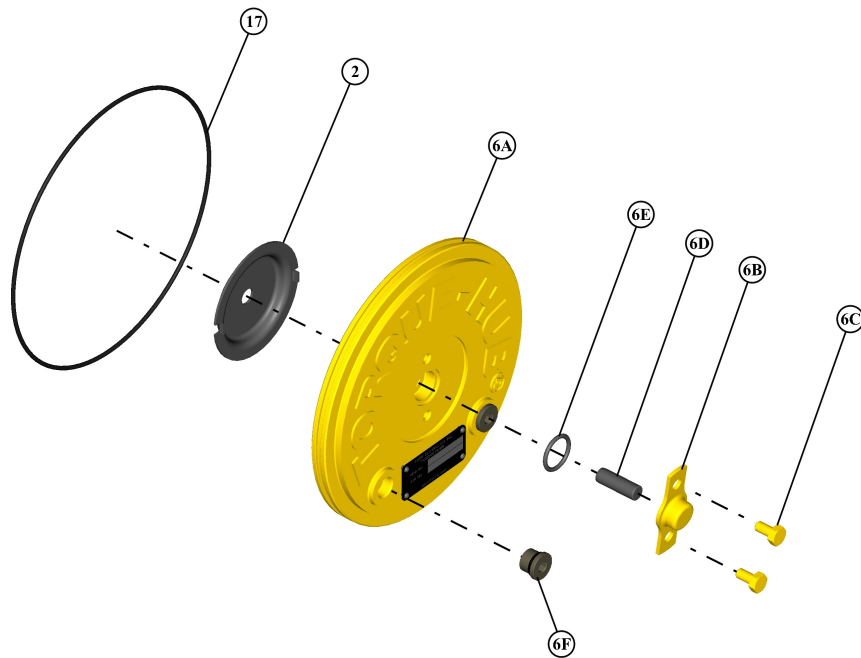


1. Remove 4 Thrust Washers (4B) from the Planet Gear (4F).
2. Remove 28 Needle Rollers (4C) from the Planet Gear (4F).
3. Remove the Thrust Spacer (4D) from the Planet Gear (4F).
4. Repeat Steps 1 through 3 for the remaining two Planet Gears (4F).

**This concludes the Output Planet Gear Disassembly.**

## Planetary Final Drive Service Manual

### Cover Disassembly

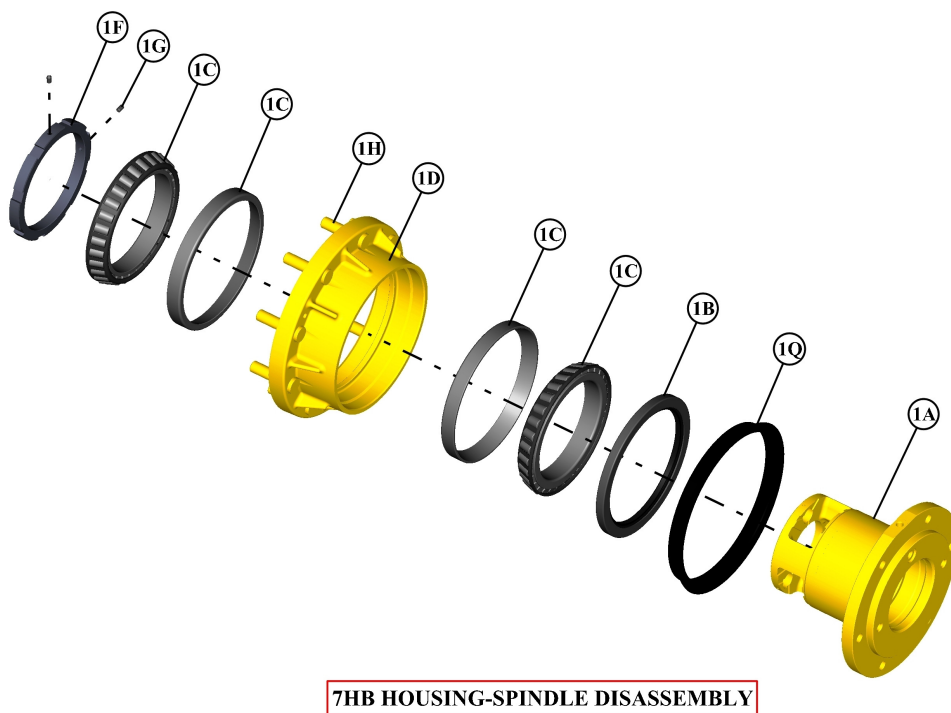
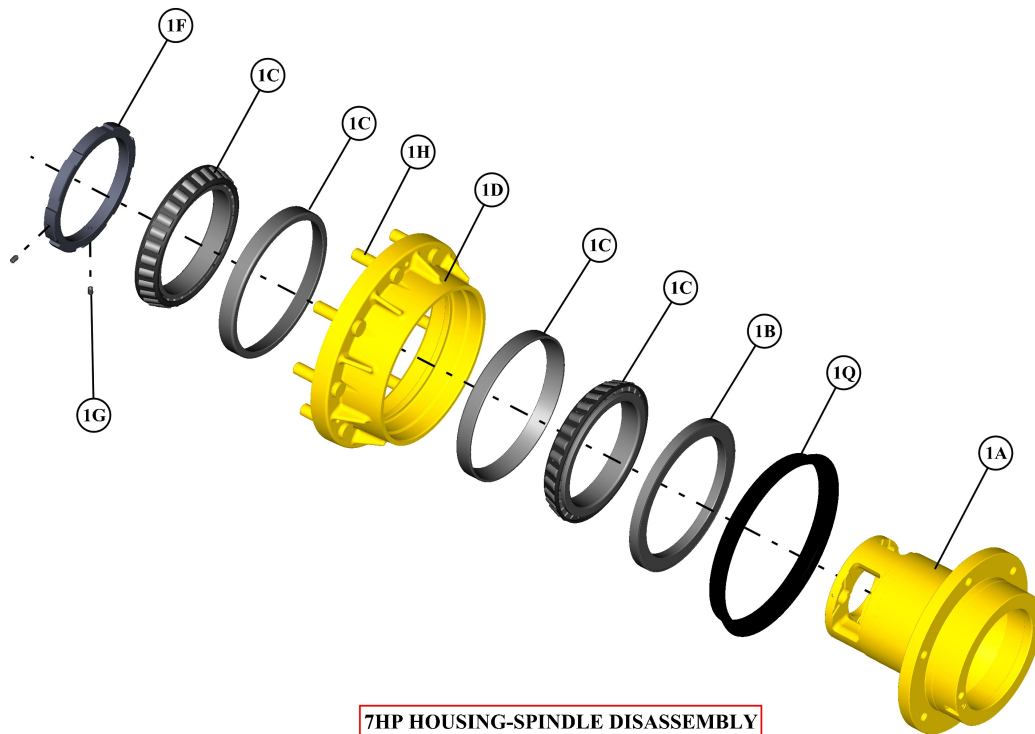


1. Remove the O-Ring (17) from groove in the Cover (6A) and discard O-Ring.
2. Remove Thrust Washer (2) from pockets in the Cover (6A).
3. Unscrew the Hex Head Bolts (6C) from the Disengage Cap (6B), if required.
4. Remove the Disengage Cap (6B) from the Cover (6A).
5. Pull the Disengage Rod (6D) out of the Cover (6A).
6. Remove O-Ring (6E) from the Cover (6A) and discard.

**This concludes the Cover Disassembly.**

## Planetary Final Drive Service Manual

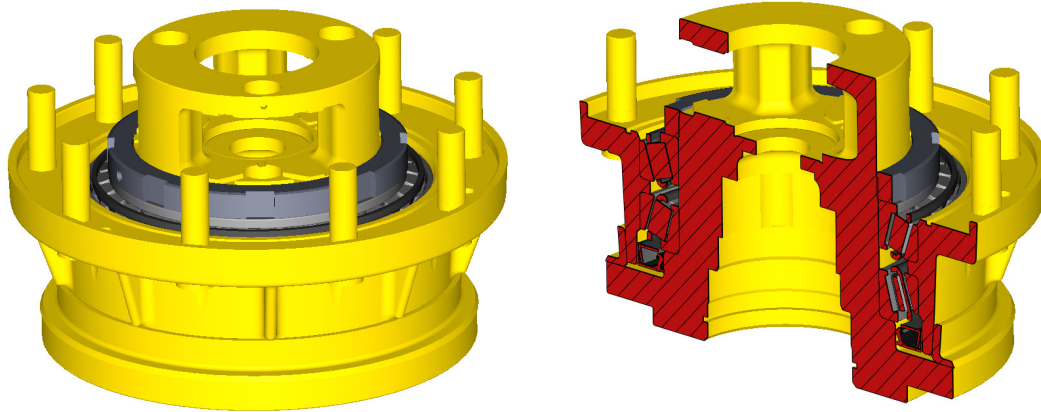
### Housing-Spindle Disassembly



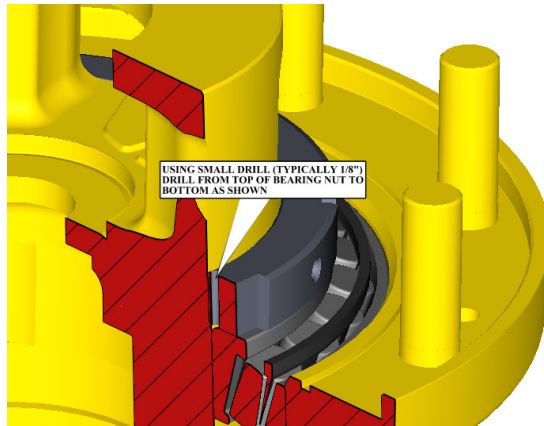
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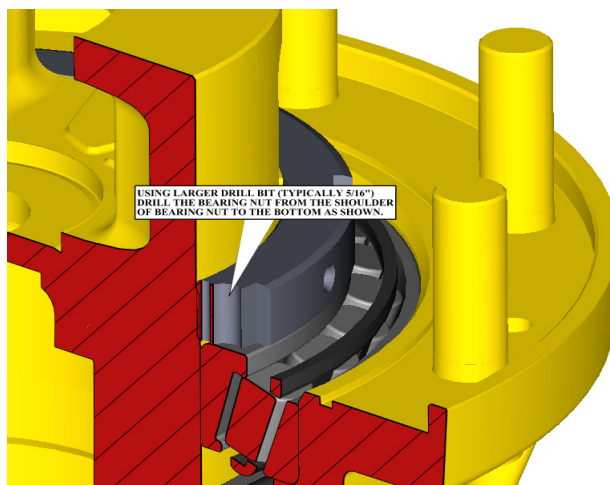
1. Set the unit on a bench so that the Spindle (1A) flange is down.



2. Using a small drill bit (typically 1/8"), drill from the top of the bearing nut to the bottom as shown below.

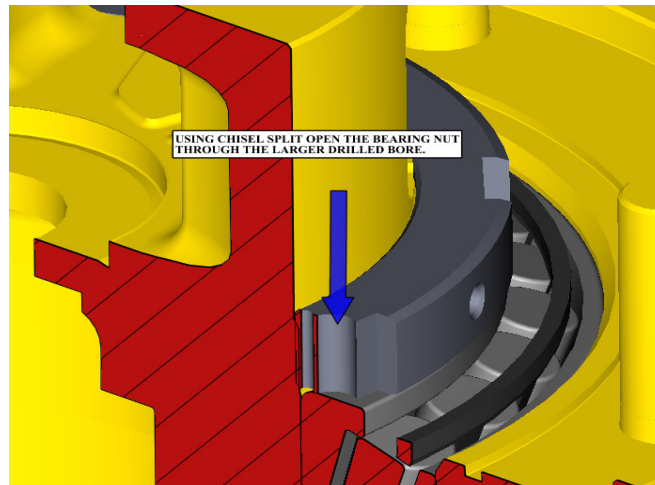


3. Using a larger drill bit (typically 5/16"), drill the bearing nut from the shoulder of the bearing nut to the bottom as shown below.



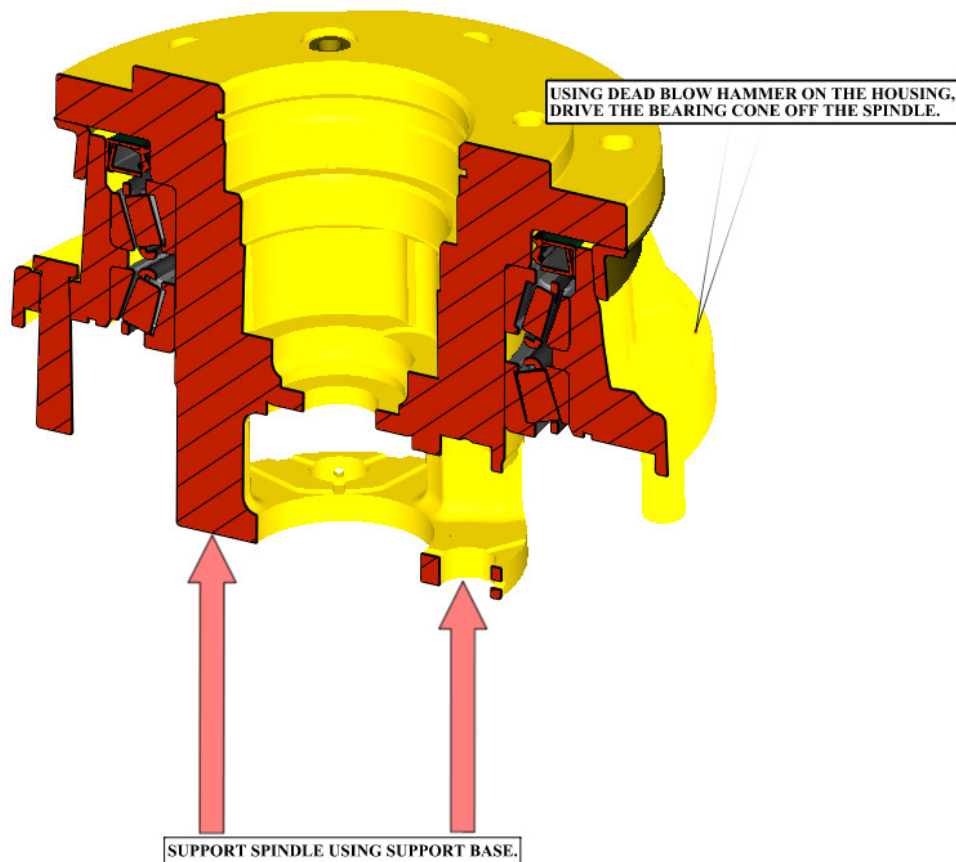
**Continued on Next Page**

4. Using a chisel, split open the bearing nut through the larger drilled bore as shown below.



**NOTE:** The holes in the Bearing Nut (1F) for the Set Screws (1G) were staked for retention of the Set Screws (1G). The holes will need to be cleaned up prior to removing the Set Screws.

5. Turn the unit over and carefully place the unit on a support base until the Spindle (1A) rests on it. Ensure there is enough gap to lower the Housing (1D) down.



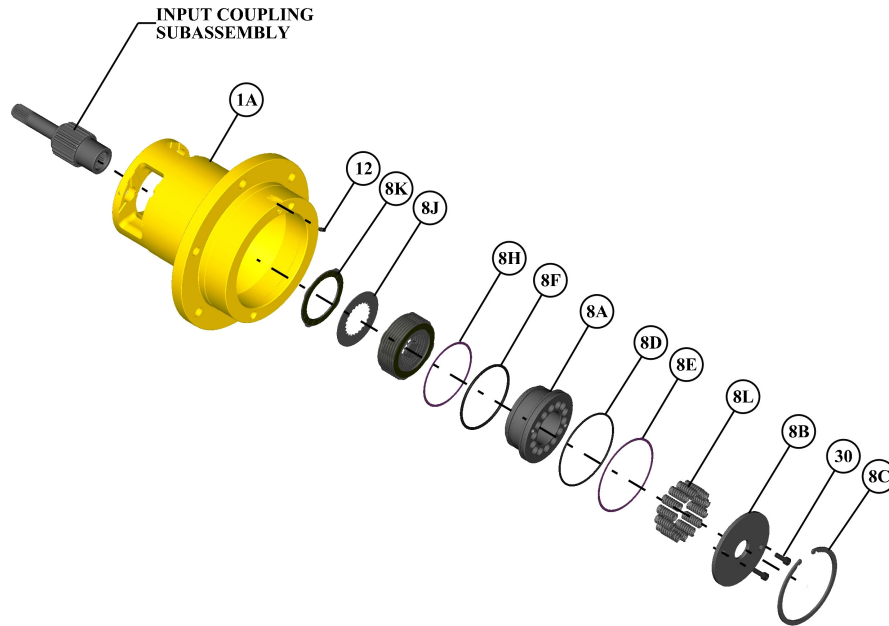
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6. Use a dead blow hammer on the Housing (1D) flange to drive the inboard Bearing Cone (1C) off of the Spindle.
7. Lift the Spindle (1A) out of the Housing (1D).
8. If necessary, remove the Boot Seal (1Q).
9. Remove Lip Seal (1B) from Housing (1D).
10. Remove the Bearing Cone (1C) from Housing (1D).
11. Using a hammer and punch drive the inboard Bearing Cup (1C) out of the Housing (1D). Be careful not to damage the counter bore in the housing.
12. Turn the Housing (1D) over and drive the outboard Bearing Cup (1C) out of the Housing. Be careful not to damage the counter-bore in the housing.

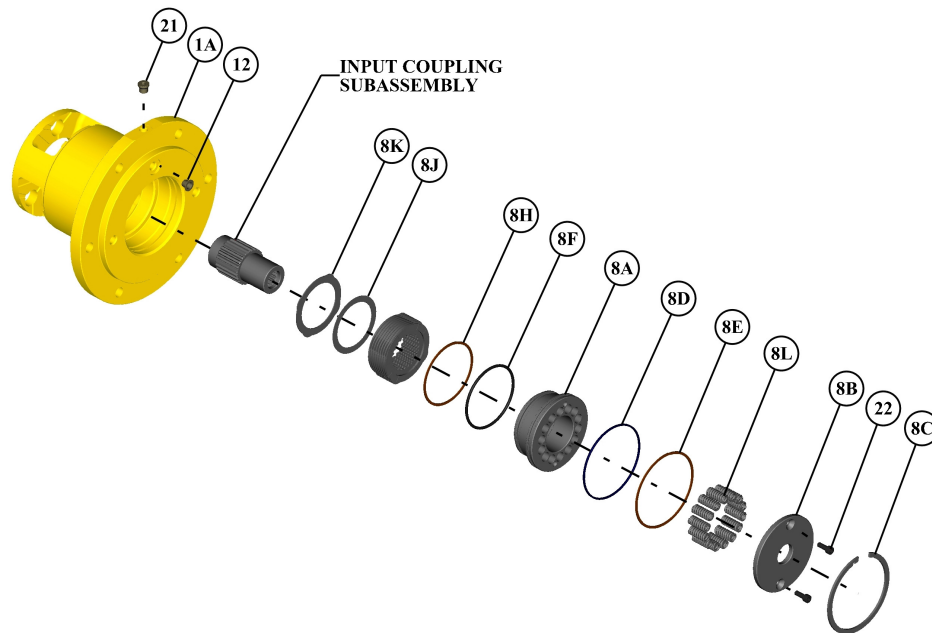
**This concludes the Housing-Spindle Disassembly.**

## Planetary Final Drive Service Manual

### Input Brake Disassembly



7HP INPUT BRAKE DISASSEMBLY



7HB INPUT BRAKE DISASSEMBLY

Continued on Next Page

**NOTE:** Skip step 1 for 7HB unit.

1. Remove Input coupling sub assembly from the unit.
2. Place Spindle (1A) such that the flange side is up.

**CAUTION:** Safety glasses must be worn during these next steps.

3. Install two Socket Head Cap Screws (22)/(30) through the Thrust Plate (8B) and into the Brake Piston (8A) and tighten incrementally to compress the brake springs (8L) and take pressure off of the Retaining Ring (8C).
4. Remove the Retaining Ring (8C) from counter bore of the Spindle (1A).
5. Remove two Socket Head Cap Screws (22)/(30) from the Brake Piston (8A) incrementally to release the tension of the springs slowly.
6. Remove the Brake Thrust Plate (8B).

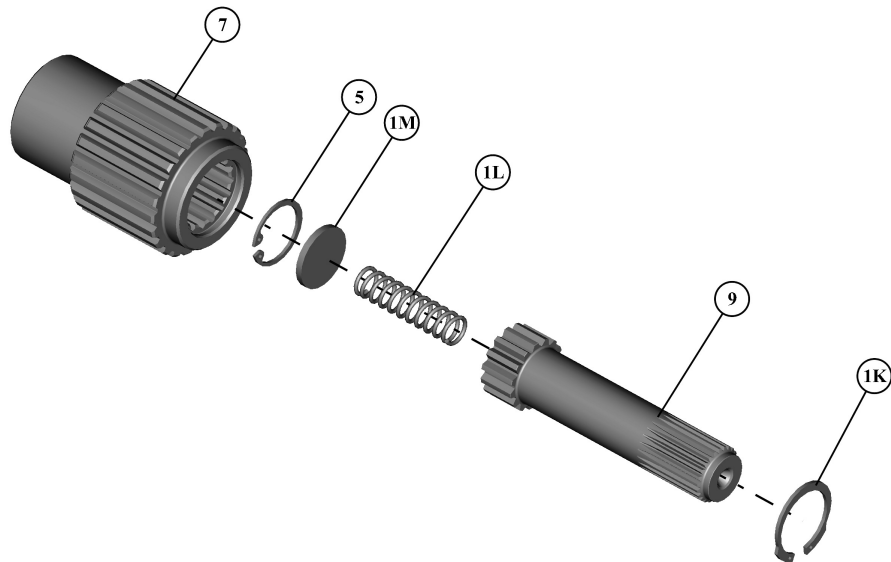
**NOTE:** Skip step 7 for 7HP unit.

7. Remove Input coupling sub assembly from the unit.
8. Remove the Brake Springs (8L) from the Brake Piston (8A).
9. Remove the Brake Piston (8A) out of the Spindle (1A).
10. Remove the Backup Ring (8E) and the O-ring (8D) from grooves in the Brake Piston (8A).
11. Remove the Backup Ring (8H) and the O-ring (8F) from grooves in the Spindle (1A).
12. Remove the Stators (8J) and Rotors (8K) from the spindle counter bore.
13. Remove Plastic Plug (12) & Pipe Plug (21) from Spindle (1A) if applicable.

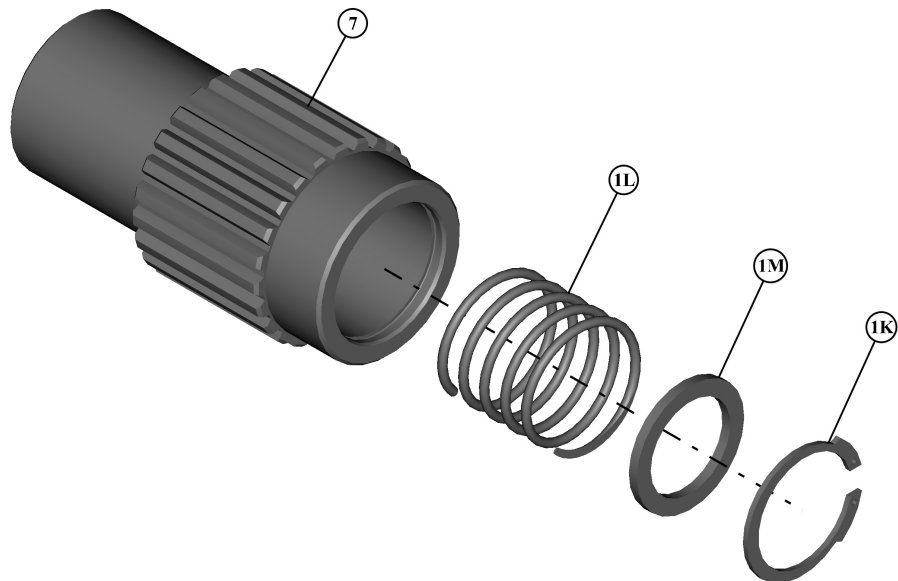
**This concludes the Input Brake Disassembly.**

## Planetary Final Drive Service Manual

### Input Coupling Disassembly



7HP INPUT COUPLING DISASSEMBLY



7HB INPUT COUPLING DISASSEMBLY

Continued on Next Page

**CAUTION:** Safety glasses must be worn during these next steps.

**NOTE:** Skip steps 1 through 5 for 7HB Input Coupling Disassembly.

1. Remove Retaining Ring (1K) from retaining ring groove of Coupling (7).
2. Remove the Input Shaft (9) from Coupling (7).
3. Remove the Spring (1L) from bore of Coupling (7).
4. Remove the Spacer (1M) from bore of Coupling (7).
5. Remove the Retaining Ring (5) from bore of Coupling (7).

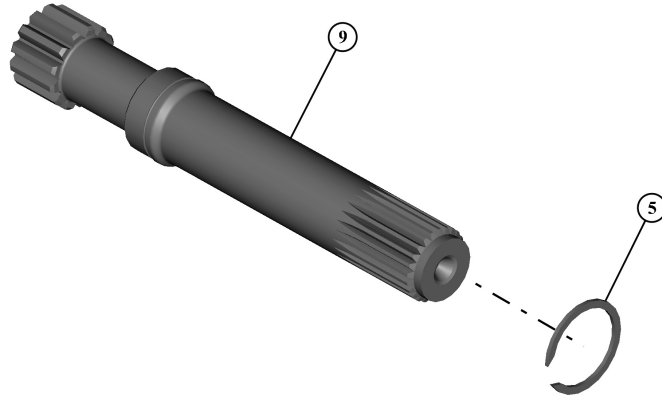
**NOTE:** Skip steps 6 through 8 for 7HP Input Coupling Disassembly.

6. Remove the Retaining Ring (1K) from retaining ring groove of Coupling (7).
7. Remove the Thrust Washer (1M) from bore of Coupling (7).
8. Remove the Spring (1L) from bore of Coupling (7).

**This concludes the Input Coupling Disassembly.**

## Planetary Final Drive Service Manual

### Input Shaft Disassembly for 7HB



#### 7HB INPUT SHAFT DISASSEMBLY

**CAUTION:** Safety glasses must be worn during these next steps.

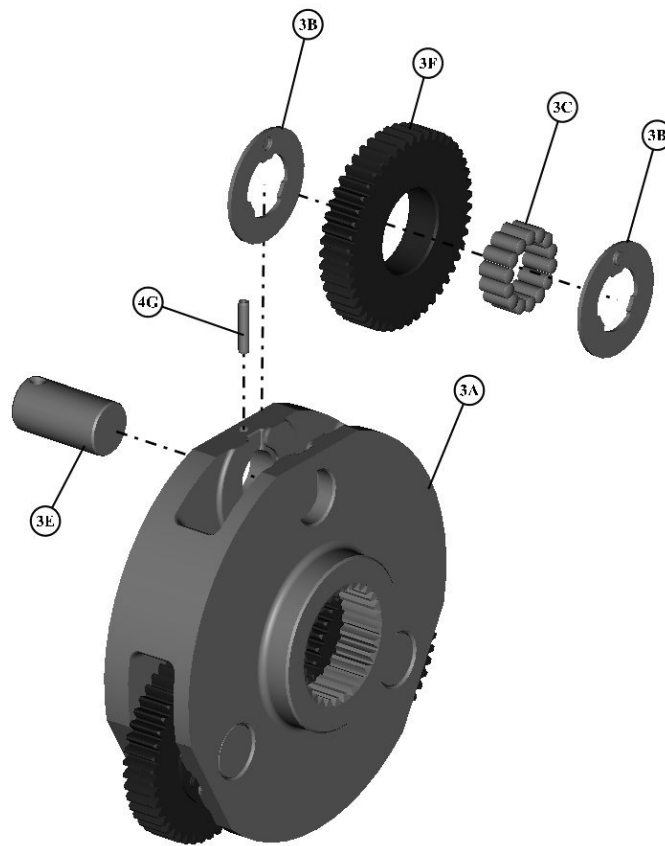
1. Remove Retaining Ring (5) from the Input Shaft (9).

**This concludes the Input Shaft Disassembly.**



## Planetary Final Drive Service Manual

### Input Carrier Disassembly



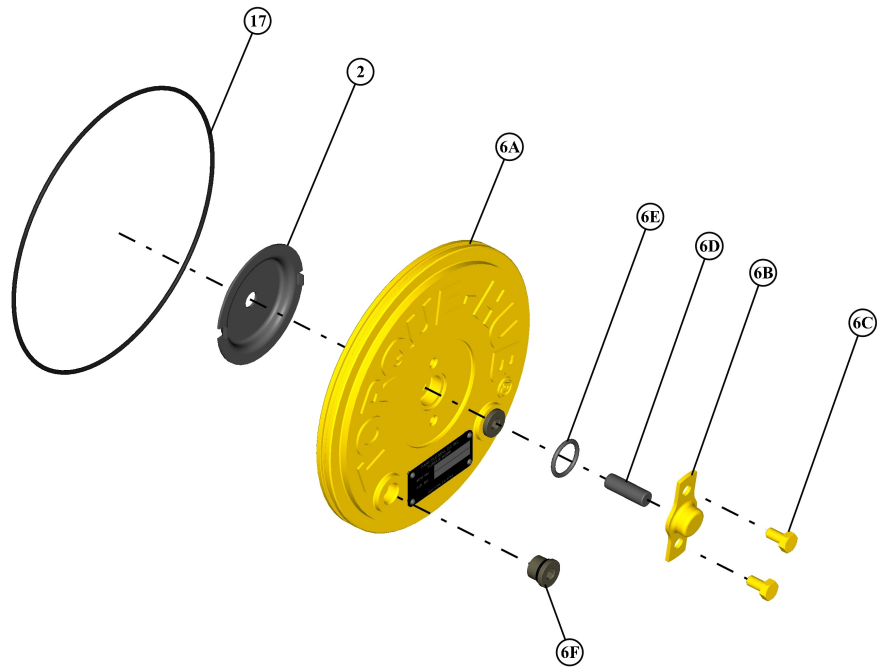
1. Drive the Planet Shaft (3E) out of the carrier pin holes; forcing the Roll Pin (4G) to shear off.
2. Hold on to the Planet Gear (3F) and push the Planet Shaft (3E) out of the Carrier (3A). The Thrust Washers (3B) will slide off the shaft as it is removed.
3. Using a hammer and punch, drive the Roll Pin (4G) out of the Planet Shaft (3E) and Carrier.
4. Remove the Needle Bearings (3C) from the inside of the Planet Gear (3F).
5. Repeat steps 1-4 for the remaining two Planet Gears (3F).

**This concludes the Input Carrier Disassembly.**

# ASSEMBLY

## Planetary Final Drive Service Manual

### Cover Subassembly



1. Install two Pipe Plugs (6F) into the Cover (6A).
2. Grease the O-ring (17) and place it in the groove in the Cover (6A).
3. Grease the Thrust Washer (2) and place on the inner hub of the Cover (6A), keeping the two tangs aligned with the cast slots in the Cover (6A).
4. Grease the O-ring (6E) and install into the internal groove in the Cover (6A).
5. Attach the Disengage Cap (6B) to the Cover (6A) using Hex Bolts (6C). Tighten the Bolts to a torque of 70-80 in-lbs.
6. Turn the Cover (6A) over and push Disengage Rod (6D) until Disengage Rod (6D) bottoms out on the Disengage Cap (6B).

**This concludes the Cover Subassembly.**

- Continued on Next Page**

7. Finish pushing the Planet Shaft (3E) into the Carrier (3F) until roll pin holes of Planet Shaft and Carrier are aligned. Align roll pin holes using a 1/8" diameter punch.

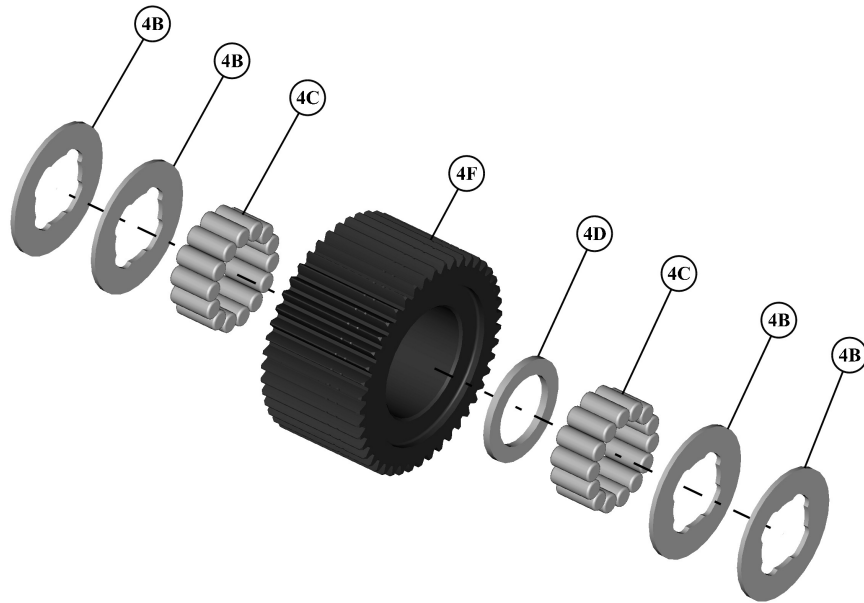
**NOTE:** The chamfer on the Roll Pin hole should be towards the roll pin hole in the Carrier.

8. Drive the Roll Pin (4G) into the roll pin hole in carrier and into the Planet Shaft (3E) until the end of the roll pin is flush with the outside diameter of Carrier (3F).
9. Repeat steps 4 to 8 for the remaining two Planet Gears (3F).

**This concludes the Input Carrier Subassembly.**

## Planetary Final Drive Service Manual

### Output Planet Gear Subassembly



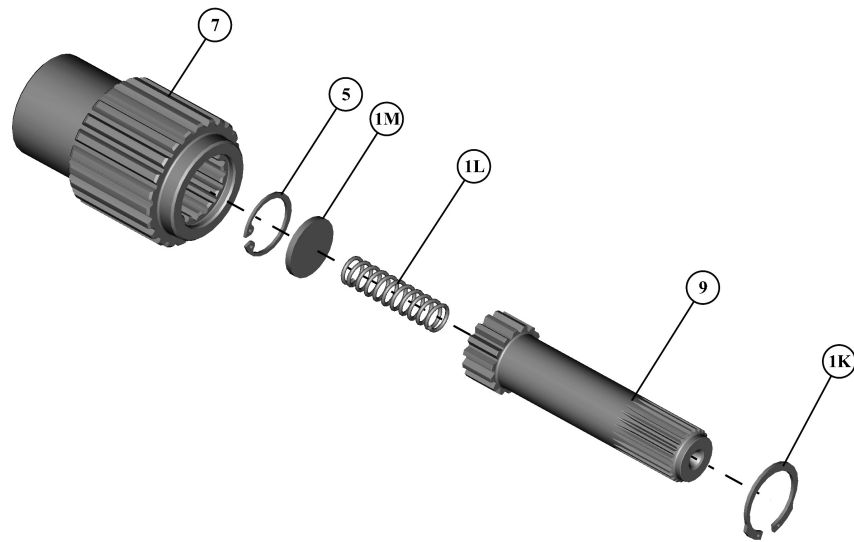
1. Apply a liberal coat of grease to the bore of the Planet Gear (4F). This will enable the Needle Rollers (4C) to be held in place during assembly.
2. Install one half of the inside of the Planet Gear (4F) with 14 Needle Rollers (4C).  
**NOTE:** The last roller installed must be installed end wise. That is, the end of the last roller must be placed in between the ends of the two rollers that form the space, and then slide parallel to the other rollers into place.
3. Place one Spacer (4D) on top of the Needle Rollers (4C) inside the Planet Gear (4F).
4. Install the other half of the Planet Gear (4F) with 14 Needle Rollers (4C).
5. Apply grease to hold two Thrust Washers (4B) together and onto Output Planet Gear (4F) counter bore. Do the same to the other side.
6. Repeat Steps 1-5 to finish the assembly of the two remaining Output Planet Gears (4F).

**This concludes the Output Planet Gear Sub-Assembly.**

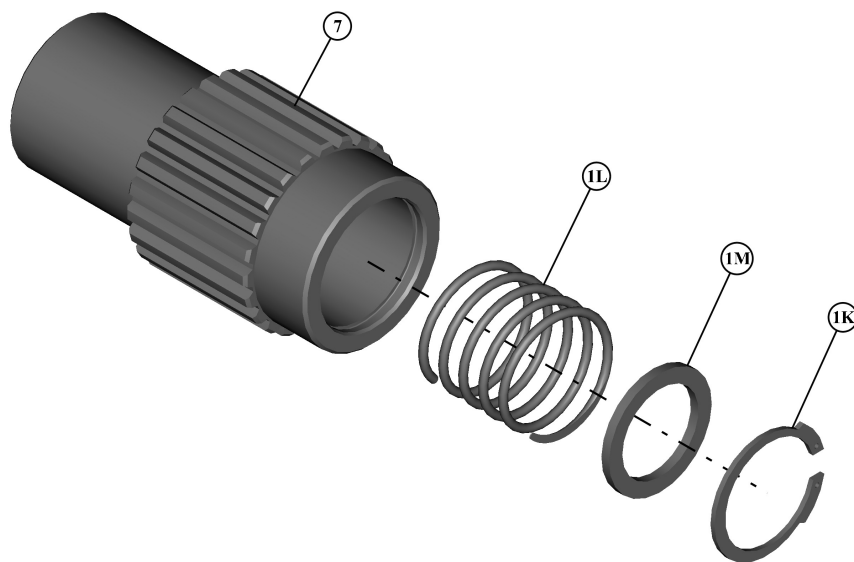
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## Planetary Final Drive Service Manual

### Input Coupling Subassembly



7HP INPUT COUPLING SUBASSEMBLY



7HB INPUT COUPLING SUBASSEMBLY

Continued on Next Page



**CAUTION:** Safety glasses must be worn during this next step.

**NOTE:** Skip steps 1 through 6 for 7HB Input Coupling Subassembly.

1. Install the Retaining Ring (5) into Coupling (7).
2. Install the Spacer (1M) into Coupling (7).
3. Install the Spring (1L) into the Input Coupling (7) bore.
4. Slide the Retaining Ring (1K) onto Input Shaft (9).
5. Install the Input Shaft (9) into the Input Coupling (7). Make sure that the splines are engaged.
6. Install the Retaining Ring (1K) into the retaining ring groove of Input Coupling (7) using retaining ring installation tool.

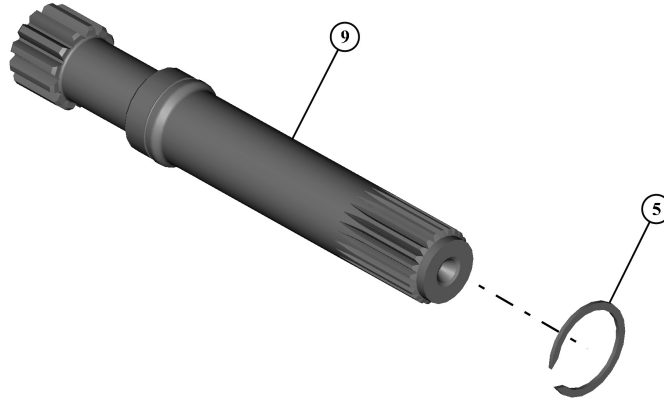
**NOTE:** Skip steps 7 through 9 for 7HP Input Coupling Subassembly.

7. Install the Spring (1L) into the Input Coupling (7) bore.
8. Install the Thrust Washer (1M) into Coupling (7).
9. Install the Retaining Ring (1K) into the retaining ring groove of Input Coupling (7) using retaining ring installation tool.

**This concludes the Input Coupling Subassembly.**

## Planetary Final Drive Service Manual

### Input Shaft Subassembly for 7HB



#### 7HB INPUT SHAFT SUBASSEMBLY

**CAUTION:** Safety glasses must be worn during these next steps.

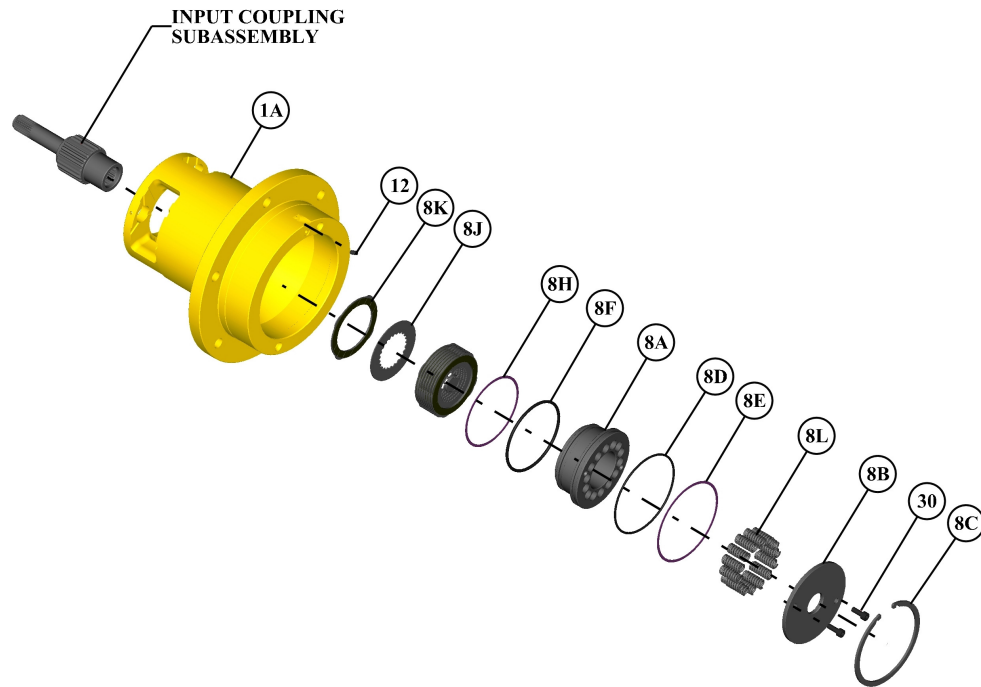
1. Install Retaining Ring (5) into the Input Shaft (9).

**This concludes the Input Shaft Subassembly.**

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## Planetary Final Drive Service Manual

### Input Brake Subassembly for 7HP



7HP INPUT BRAKE SUBASSEMBLY

**NOTE:** Use an air gun to clean up the brake port and make sure there are no chips inside.

1. Place Spindle (1A) such that the flange side is up.
2. Place Stator (8K) into the spindle (1A) scallop cuts.
3. Place Rotor (8J) on top of Stator (8K).
4. Repeat steps 2 and 3 until there are a total of 6 Stators (8K) and 5 Rotors (8J) installed.

**NOTE:** There should always be a stator on the top and bottom of the stack.

5. Grease and install O-Ring (8F) into Spindle O-Ring groove.
6. Gradually feed Back-up Ring (8H) underneath O-Ring (8F). Using a small pick, push one end of the Back-up Ring (8H) to completely seat it in the groove. This ensures that the piston will not cut the Back-up Ring (8H) during assembly.
7. Install large Backup Ring (8E) in groove on Piston (8A).
8. Grease and install large O-Ring (8D) in the large-diameter groove towards the small Diameter end of Piston (8A) on top of the large Backup Ring (8E).

Continued on Next Page

9. Press Piston (8A) into Spindle (1A) until the small end contacts the Stator (8K).
10. Insert appropriate number of springs (8L) into Piston (8A). (Refer Brake Chart in page 6).
11. Place Pressure Plate (8B) on top of springs (8L).

**CAUTION:** Safety glasses must be worn during these next steps.

12. Install two M6 socket head cap screws (30) through the Pressure Plate (8B) into Piston (8A). After springs (8L) have been compressed enough, install Retaining Ring (8C) into Spindle (1A) groove. Remove the two M6 socket head cap screws.

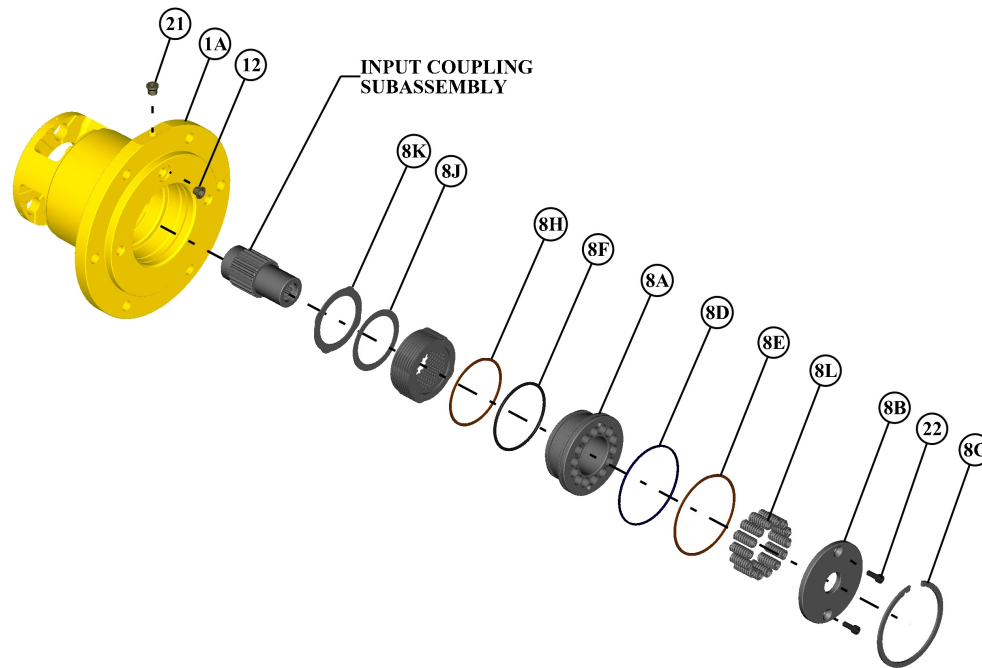
**NOTE:** Remove 2 Screws from units when done, otherwise brake will not function.

13. Using appropriate tool install Pressure Plug (12) into Spindle (1A).
14. With the brake pressurized, flip Spindle-Motor Sub-assembly (1A) over.
15. Insert 7HP Coupling Sub-Assembly (7) through Rotors (8J).
16. Pressurize the brake cavity and check for leaks.

**This concludes the Input Brake Subassembly for 7HP.**

## Planetary Final Drive Service Manual

### Input Brake Subassembly for 7HB



**7HB INPUT BRAKE SUBASSEMBLY**

1. Place Spindle (1A) such that the flange side is up.
2. Place Stator (8K) into the Spindle (1A) scallop cuts.
3. Place Rotor (8J) on top of Stator (8K).
4. Repeat steps 2 & 3 until there are a total of 9 Stators (8K) and 8 Rotors (8J) installed.  
**NOTE:** There should always be a stator on the top and bottom of the stack.
5. Place Piston (8A) such that the smaller O.D. end is facing upward. Grease the two O-Rings and the two Backup Rings.
6. Install large O-Ring (8D) in the large-diameter groove at the bottom of the Piston (8A), on top of the large Backup Ring (8E).
7. Install large Backup Ring (8E) in the large-diameter groove at the bottom of the Piston (8A).
8. Install small O-Ring (8F) in the small-diameter groove near the top of the Piston (8A). Make sure the O-Ring is seated on the bottom of the groove.

**Continued on Next Page**

9. Install small Backup Ring (8H) in the small-diameter groove near the top of the Piston (8A), on top of the small O-Ring (8F).
10. Insert Piston (8A) into Spindle (1A) until it contacts the Stator (8K).
11. Insert appropriate number of Springs (8L) into Piston (8A). (Refer Brake Chart in page 6).
12. Insert 7HB Coupling sub-Assembly (7) through Rotors (8J).
13. Place Pressure Plate (8B) on top of Springs (8L).

**CAUTION:** Safety glasses must be worn during these next steps.

14. Use two 1/4 -20 x .625 flat head Cap Screws (22) by bolting the Pressure Plate (8B) and Piston (8A) together or some other appropriate tools to install Retaining Ring on top of Pressure Plate (8B) until Retaining Ring (8C) is seated.

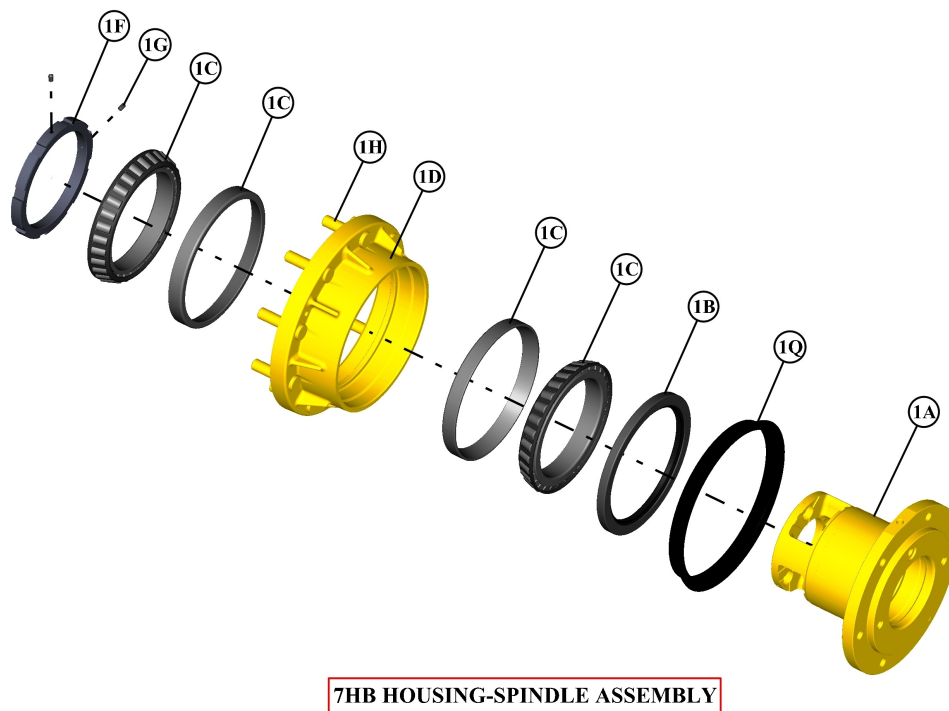
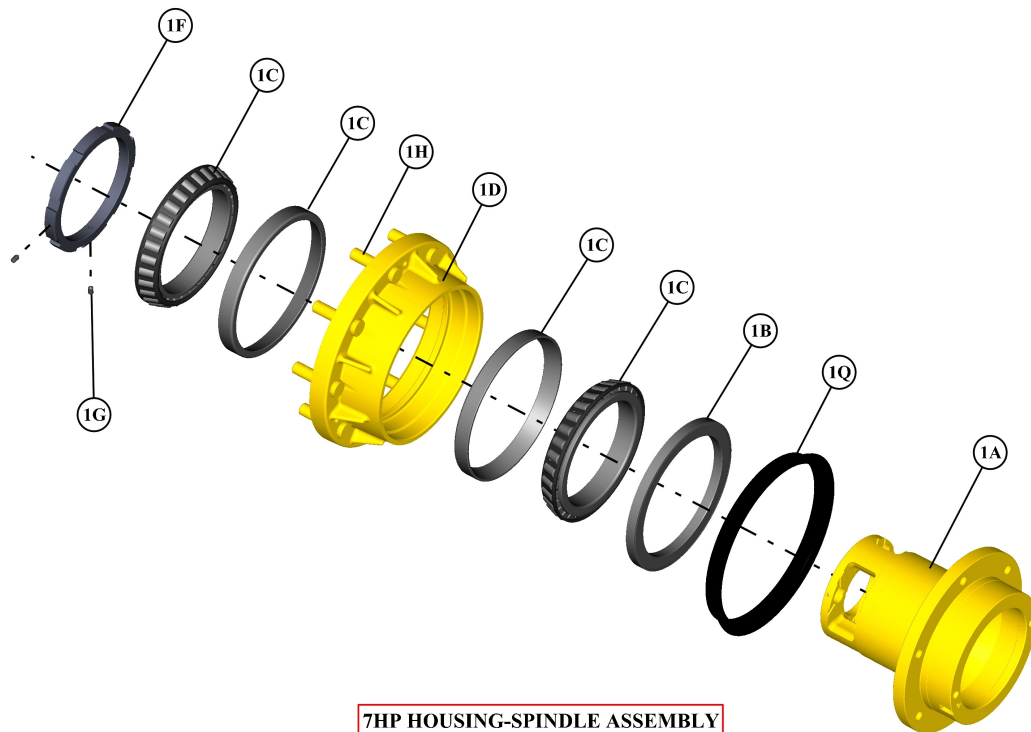
**NOTE:** Remove 2 Screws from units when done, otherwise brake will not function.

15. Install Pipe Plug (21) if applicable.
16. Pressurize the brake cavity and check for leaks.

**This concludes the Input Brake Subassembly for 7HB.**

## Planetary Final Drive Service Manual

### Housing - Spindle Subassembly



Continued on Next Page



**NOTE:** Spray a light film of oil on all component parts during assembly. Spray a generous amount of oil on bearings during installation.

1. Press one Bearing Cup (1C) into bearing counter bore of spindle end of housing until seated against shoulder in housing. Use Tool T158422.
2. Turn Housing (1D) and press one Bearing Cup (1C) using Tool T158422 into bearing counter bore of cover end of Housing (1D) making sure that it is fully seated against shoulder in the housing.
3. Place one Bearing Cone (1C) into the Housing (1D).
4. Spray the housing seal bore with alcohol, then wipe with a clean rag. Ensure there is no debris left in the bore.

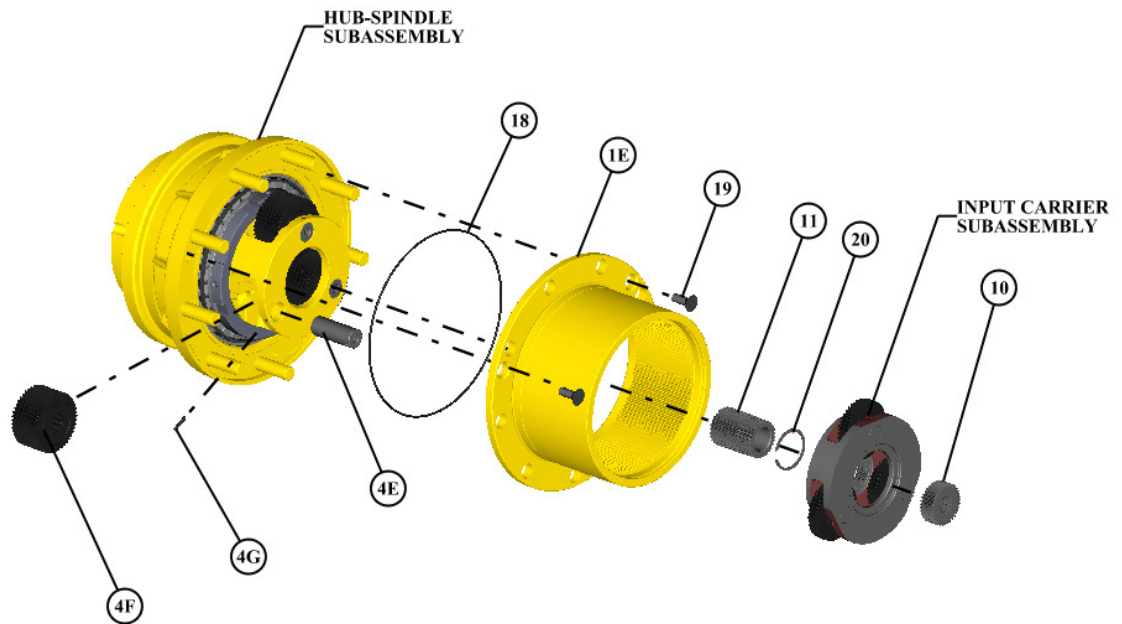
**NOTE:** Generally seals should not be reused.

5. Spray the O.D. of the Lip Seal (1B) with alcohol and wipe with a clean rag. Place and visually align the Lip Seal (1B) with spring side down into the housing (1D) seal bore. Press the seal into the housing using seal press Tool T160970. When the seal press tool makes contact with the Housing (1G) the seal is fully seated.
6. Spray the Spindle (1A) seal diameter with alcohol and wipe with a clean rag. Apply a coat of grease to the Spindle (1A) seal diameter with brush.
7. If necessary, install Boot Seal (1Q) onto Housing (1D).
8. Install the Housing (1D) onto the spindle with seal side down.
9. Place other Bearing Cone (1C) onto Spindle (1A) until it is seated in Bearing Cup (1C) in Housing (1G) and spray with a light coat of oil.
10. Apply Loctite 263 to the threads of Bearing nut (1F) and Spindle (1A).
11. Install Bearing Nut (1F) onto Spindle (1A) and tighten using locknut wrench T206569. Torque Bearing Nut (1F) to 150 ft-lbs, rotate Housing (1G) in both directions, and then torque Bearing Nut to 150 ft-lbs. Rotate Housing (1G) in both directions again and torque bearing nut to 150 ft-lbs. Repeat this until Bearing Nut (1F) does not move when 150 ft-lbs of torque is applied.
12. Apply Loctite 263 to Set Screws (1G) and install them into Bearing Nut threaded holes. Make sure Set Screw is driven into the spindle thread. Tighten the set screws to damage the thread and stake the edge of the nut around the Set Screws (1G) so the nut will not loosen.

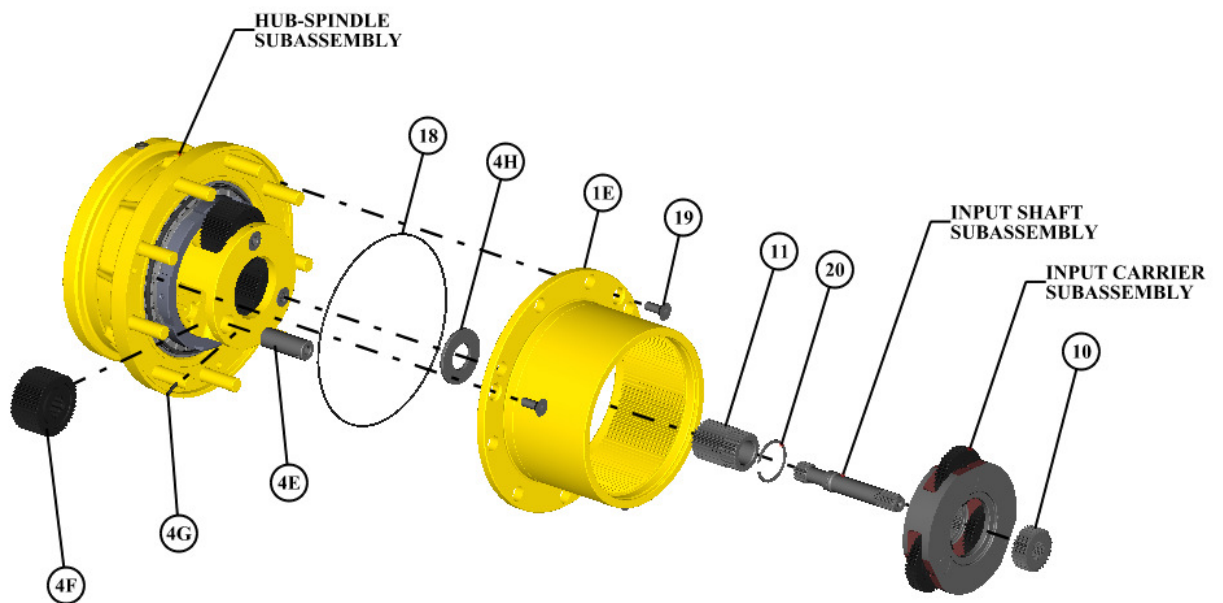
**This concludes the Housing-Spindle Subassembly.**

## Planetary Final Drive Service Manual

### Main Assembly

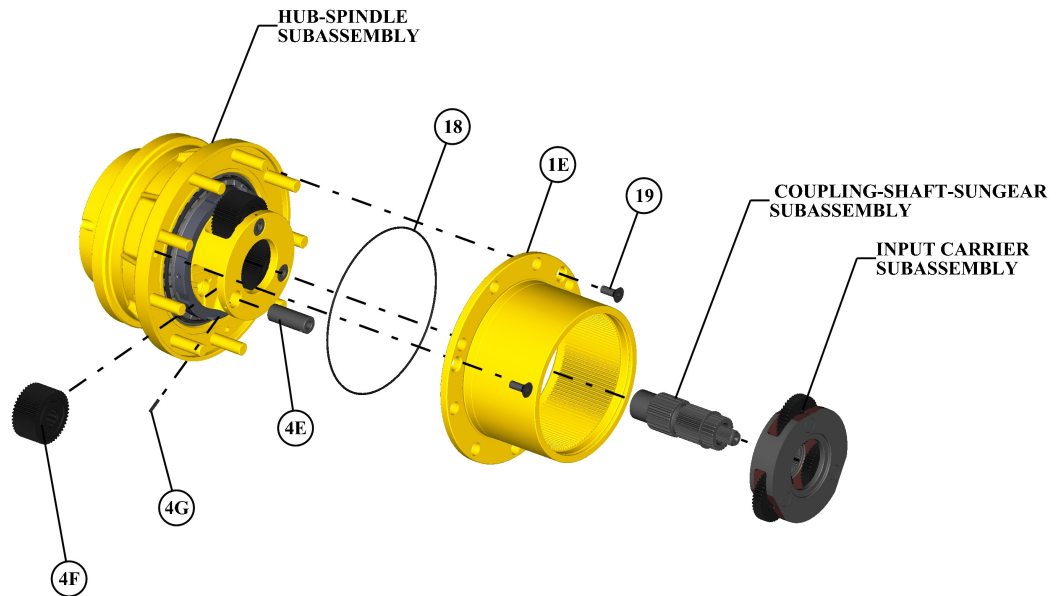


**7HP ASSEMBLY**

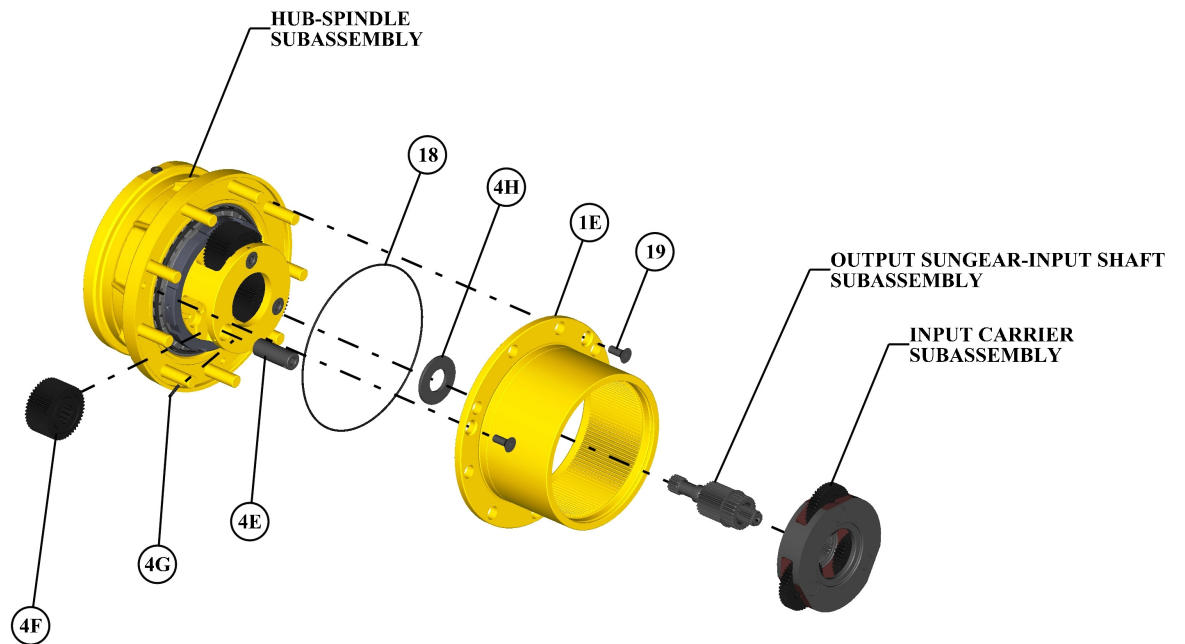


**7HB ASSEMBLY**

Continued on Next Page



**48:1 7HP ASSEMBLY**



**48:1 7HB ASSEMBLY**

Continued on Next Page

**NOTE:** Spray component parts with a liberal amount of oil as they are being assembled.

1. Place Hub-Spindle Subassembly, spindle flange side is down.

**NOTE:** On 7HP units with a ratio of greater than 36:1, install input coupling – input shaft and output sun gear subassembly before proceeding to step 2.

2. Place output planet gear assembly (4F) into the windows of spindle (1A). The output planets must have their part number facing up. Align the planet gear holes with planet shaft holes.
3. Install Planet Shaft (4E) with pin hole side up into spindle. Make sure to align the pin hole in the Planet Shaft (4E) with pin hole in Spindle (1A) while installation.
4. Using a 1/8" diameter punch, drive the Roll Pin (4G) in the Planet Shaft (4E). Insure everything is aligned and push the planet shaft (4E) into the Spindle (1A) until roll pin holes are aligned. Use an alignment punch or similar tool to align roll pin holes on Spindle (1A) and Planet Shaft (4E).
5. Drive Roll Pin (4G) down into the aligned roll pin holes. Pin should be flush with OD of spindle.
6. Install O-Ring (18) onto groove of Housing (1G).

**NOTE:** Skip step below for 7HP Disassembly.

7. Install the Thrust Washer (4H) from the counter bore in the Hub-Spindle Subassembly.
8. Place Ring Gear (1E) onto Housing (1D). Align the three shipping Cap Screw Holes on Hub (1D) and Ring Gear (1E).
9. Install three shipping Cap Screws (19) into Ring Gear (1E) and Housing (1D). Torque them to 15-20 ft-lbs.

**NOTE:** On 7HB units with a ratio of greater than 36:1, install output sun gear – input shaft assembly and proceed to step 13.

**CAUTION:** Safety glasses must be worn during these next steps.

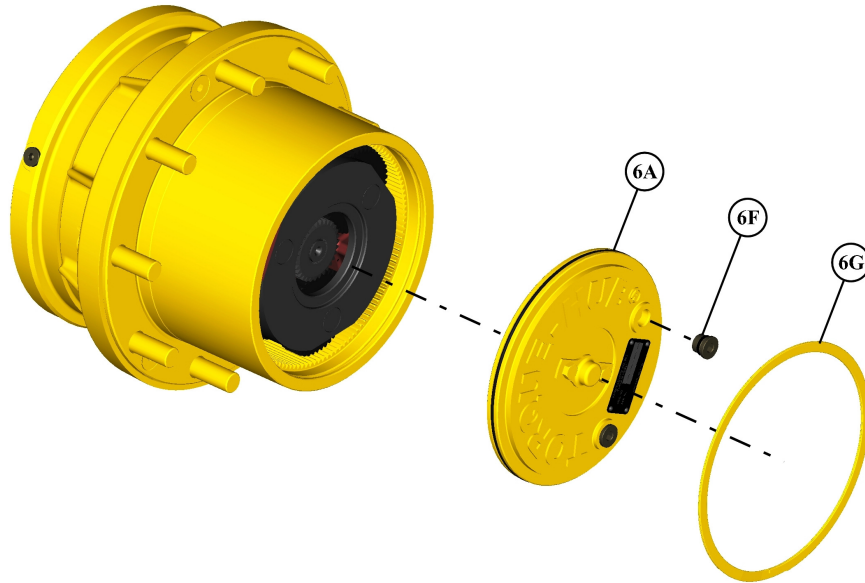
10. Install the Retaining Ring (20) on to the Sun Gear (11).
11. Install Sun gear (11) into output planet gear mesh with spline side up.

**NOTE:** Skip step 12 for 7HP Disassembly.

12. Insert Input Shaft Subassembly into Coupling until seated.
13. Install Input Carrier Subassembly into Ring Gear (1E), make sure that the splines of the Sun Gear (10) aligned with the splines of the Input Carrier Subassembly.
14. Install Input Sun Gear (10) onto input Shaft, if applicable.

**Continued on Next Page**

15. Align pipe plugs (6F) to proper location per print and install Cover Subassembly (6A) to Housing (1G) using Retaining Ring (6G).

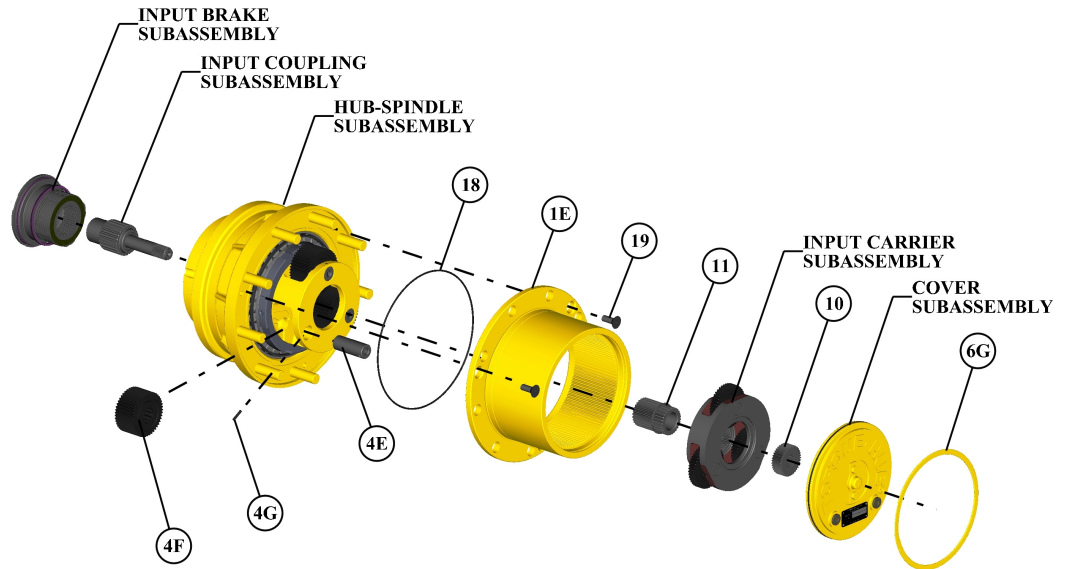


16. The Unit should be under go brake test as per instructions on page 5, 6, 7 and 8.
17. After done with brake test the unit should now be leak and roll checked as per instructions on page 9, 10, 11and 12. The motor can be reinstalled into the gearbox for the leak check to seal it off, and the unit pressurized through a pipe plug hole on the cover.

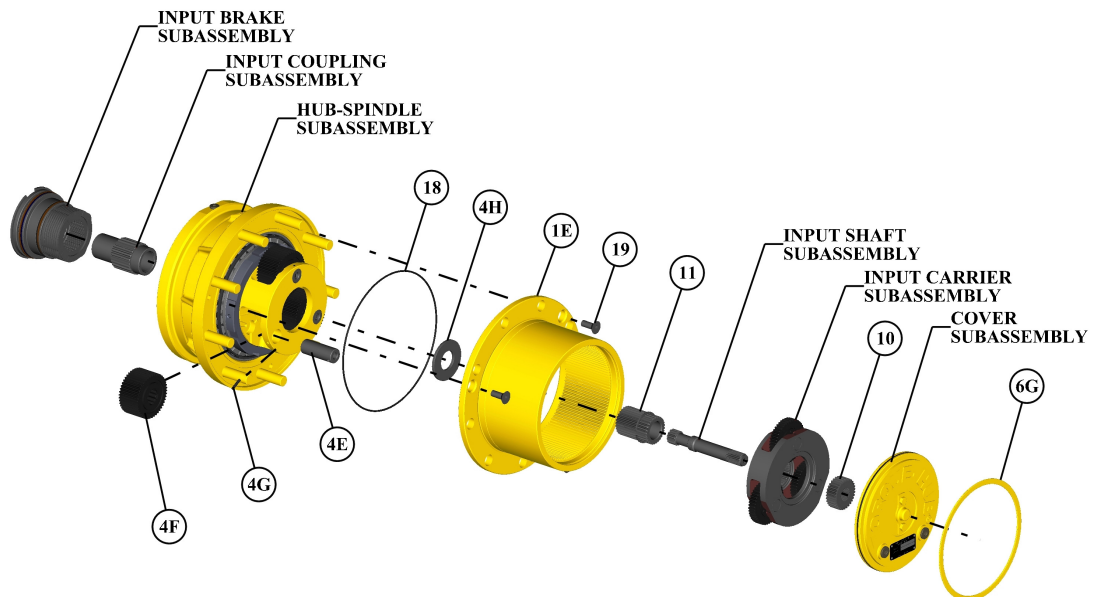
**This concludes the Main assembly.**

# Planetary Final Drive Service Manual

## Assembly Drawing



**7HP ASSEMBLY**



**7HB ASSEMBLY**

## Planetary Final Drive Repair Instructions

### Parts List

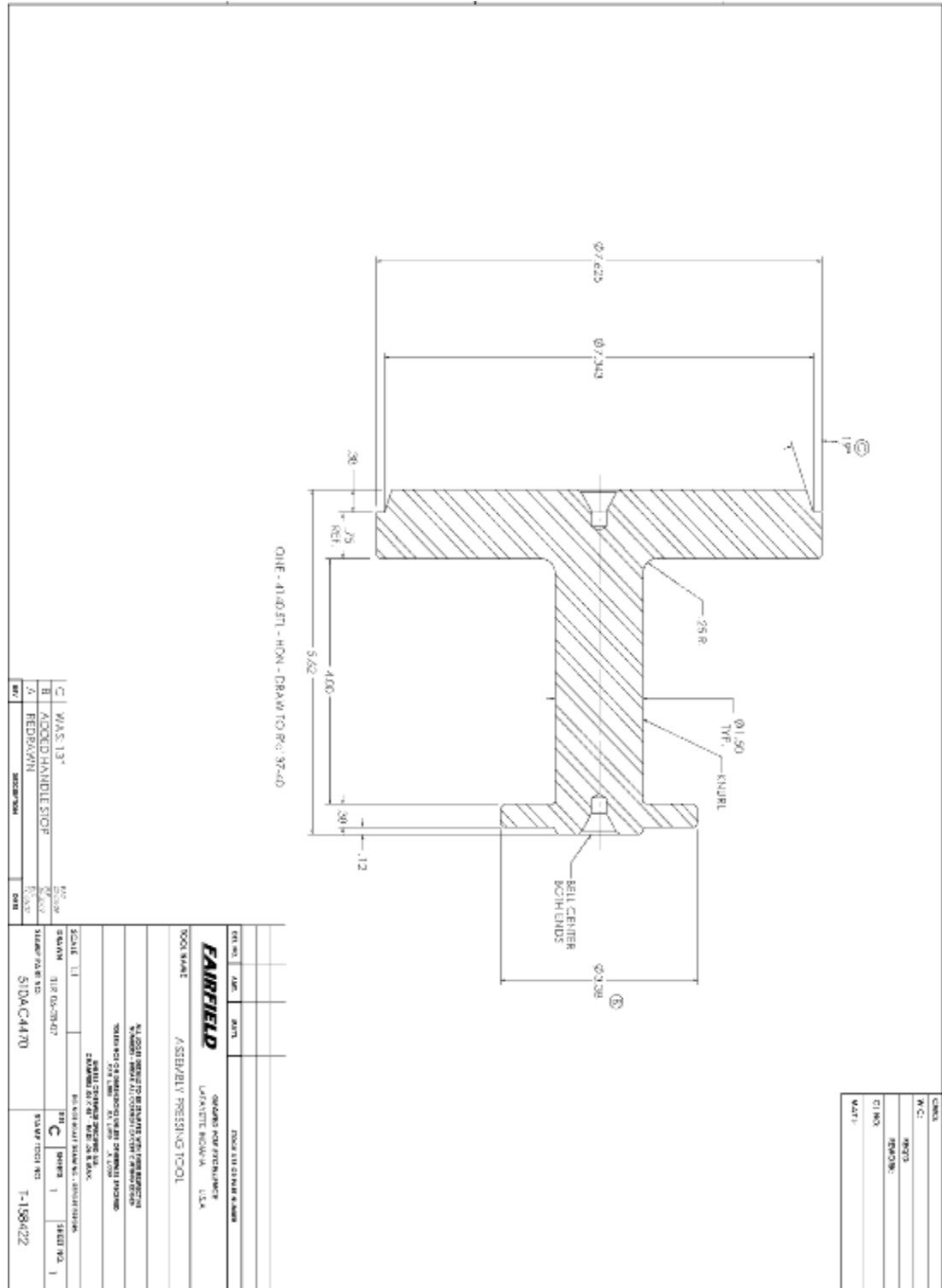
| Number | Qty | Description                          |
|--------|-----|--------------------------------------|
| 1A     | 1   | SPINDLE                              |
| 1B     | 1   | LIP SEAL                             |
| 1C     | 2   | TAPERED BEARING ASSEMBLY             |
| 1D     | 1   | HOUSING                              |
| 1E     | 1   | RING GEAR                            |
| 1F     | 1   | BEARING NUT                          |
| 1G     | 2   | SOCKET HEAD SET SCREW (.250-28,.500) |
| 1H     | 9   | STUDS                                |
| 1K     | 1   | RETAINING RING – INT 1.250           |
| 1L     | 1   | SPRING (1.225,1.500)                 |
| 1M     | 1   | THRUST WASHER                        |
| 1Q     | 1   | SEAL BOOT                            |
| 2      | 1   | THRUST SPACER                        |
| 3A     | 1   | CARRIER                              |
| 3B     | 6   | THRUST WASHER                        |
| 3C     | 42  | NEEDLE BEARING                       |
| 3E     | 3   | PLANET SHAFT                         |
| 3F     | 3   | PLANET GEAR                          |
| 4B     | 12  | THRUST WASHER                        |
| 4C     | 84  | NEEDLE BEARING                       |
| 4D     | 3   | THRUST SPACER                        |
| 4E     | 3   | PLANET SHAFT                         |
| 4F     | 3   | PLANET GEAR                          |
| 4G     | 3   | ROLL PIN                             |
| 4H     | 1   | THRUST WASHER                        |
| 5      | 1   | RETAINING RING – EXT .875            |
| 6A     | 1   | COVER                                |
| 6B     | 1   | DISENGAGE CAP                        |
| 6C     | 2   | BOLT,HEX (.250-20 UNC,.500 GR5)      |
| 6D     | 1   | DOWEL PIN                            |
| 6E     | 1   | O-RING                               |
| 6F     | 2   | PIPE PLUG                            |
| 6G     | 1   | RETAINING RING – INT 7.086           |
| 7      | 1   | COUPLING                             |
| 8A     | 1   | BRAKE PISTON                         |
| 8B     | 1   | PRESSURE PLATE                       |
| 8C     | 1   | RETAINING RING – INT 4.000           |
| 8D     | 1   | O-RING                               |

| Number | Qty | Description                         |
|--------|-----|-------------------------------------|
| 8E     | 1   | BACK-UP RING                        |
| 8F     | 1   | O-RING                              |
| 8H     | 1   | BACK-UP RING                        |
| 8J     | 8   | BRAKE ROTOR                         |
| 8K     | 9   | BRAKE STATOR                        |
| 8L     | *   | SPRING, H.D.(.492,1.260)            |
| 9      | 1   | INPUT SHAFT                         |
| 10     | 1   | SUN GEAR                            |
| 11     | 1   | SUN GEAR                            |
| 12     | 1   | O-RING PLUG or PLASTIC PLUG         |
| 17     | 1   | O-RING                              |
| 18     | 1   | O-RING                              |
| 19     | 3   | BOLT, FLAT HEAD – HEX SKT (.375-16) |
| 20     | 1   | RETAINING RING – EXT 1.562          |
| 21     | 1   | O-RING PLUG                         |
| 22     | 2   | SOCKET HEAD CAP SCREWS              |
| 30     | 2   | SOCKET HEAD CAP SCREWS              |

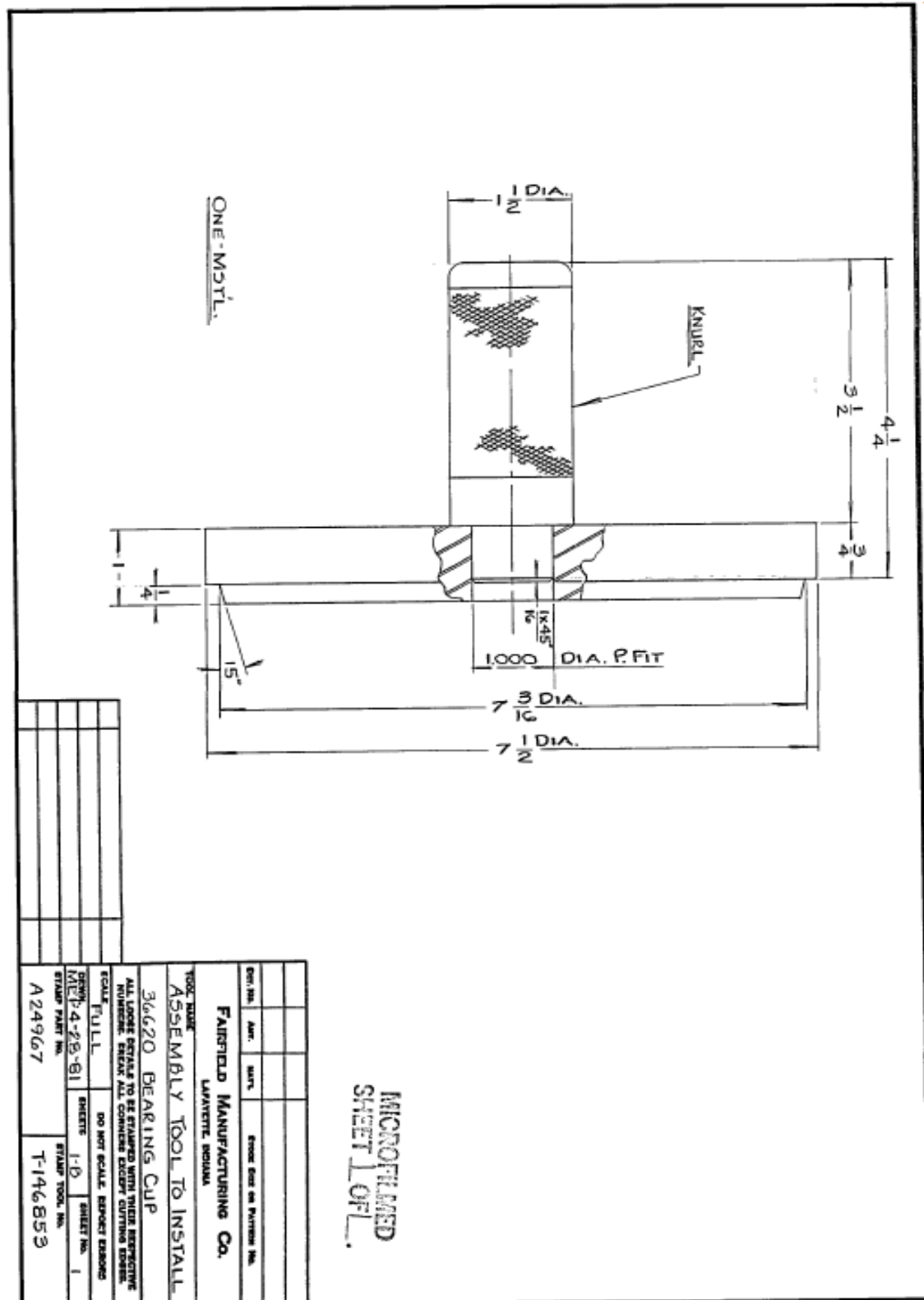
**NOTE:** \* For Spring (8L) quantity, refer to the Brake Chart under Brake Test on page 6.



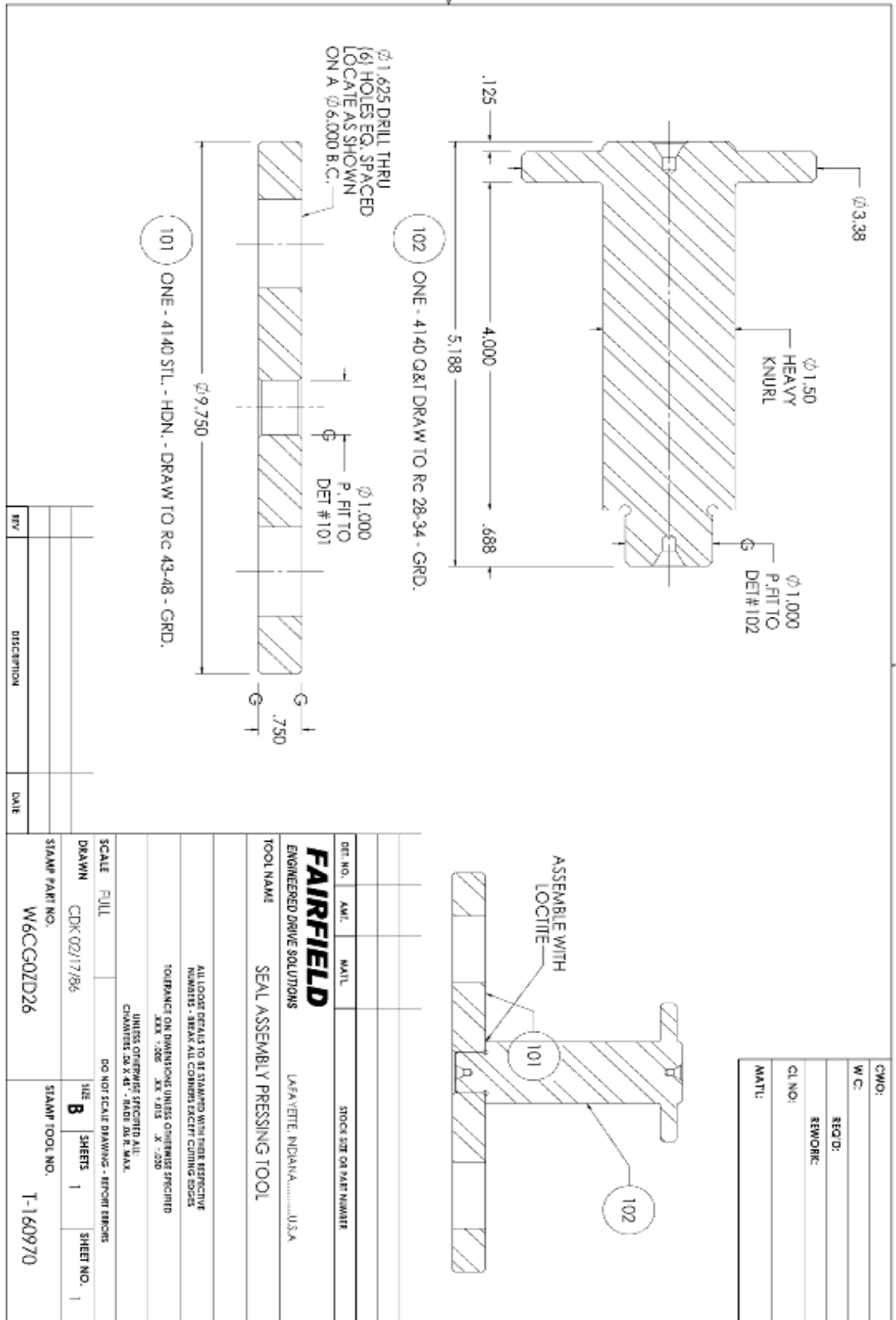
## T158422-CUP PRESS TOOL



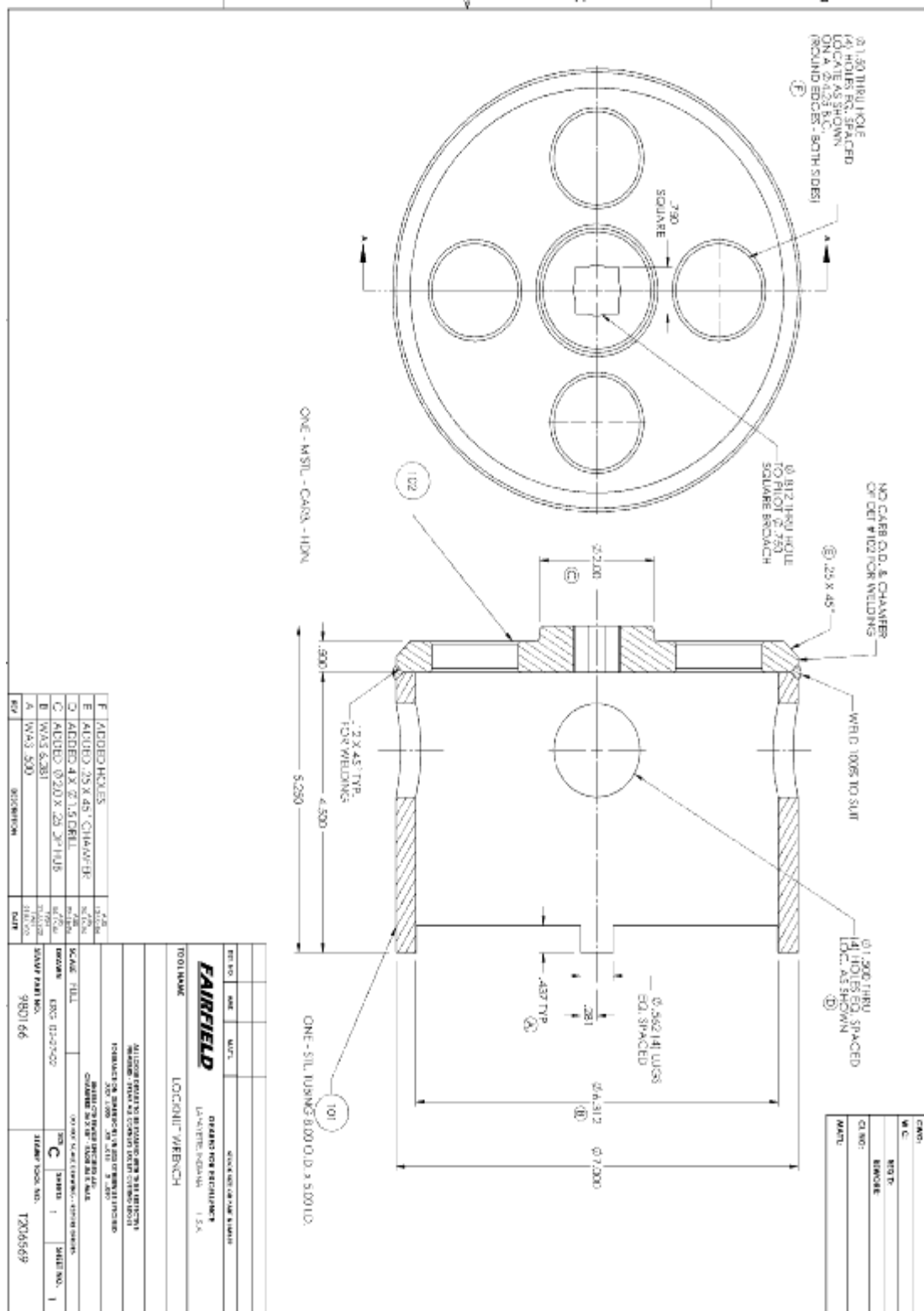
# T146853- BEARING CUP PRESS TOOL



# T160970-SEAL PRESS TOOL



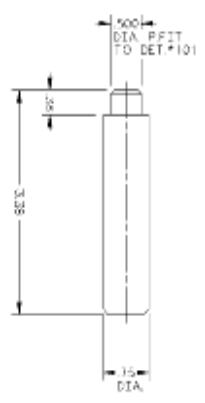
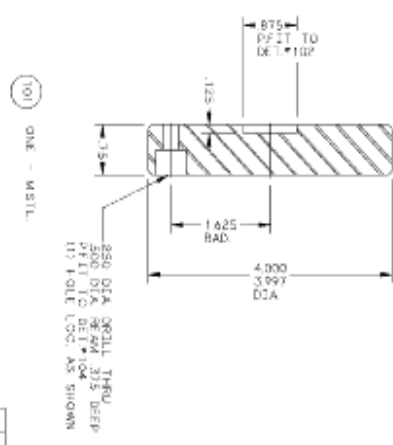
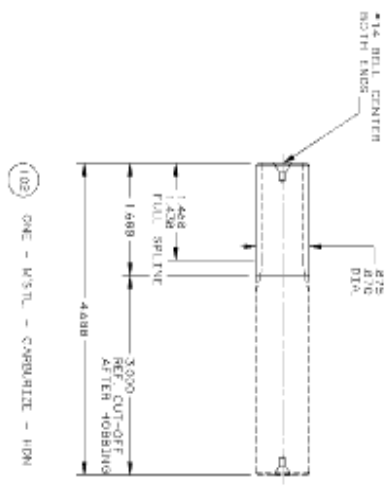
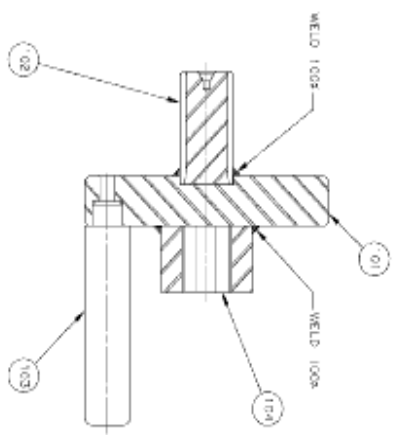
## T206569-LOCKNUT TOOL



## T163057-ROLL CHECK TOOL

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-000.5  
-61327  
-140316  
SCLINE HOG 16.32 PITCH 30 DEG P.A.  
BARBER COLMAN DRIVING OOG



|          |
|----------|
| CWO -    |
| W.C. -   |
| REDO -   |
| REWORK - |
| CLAO -   |
|          |
| MATL -   |
|          |

UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK

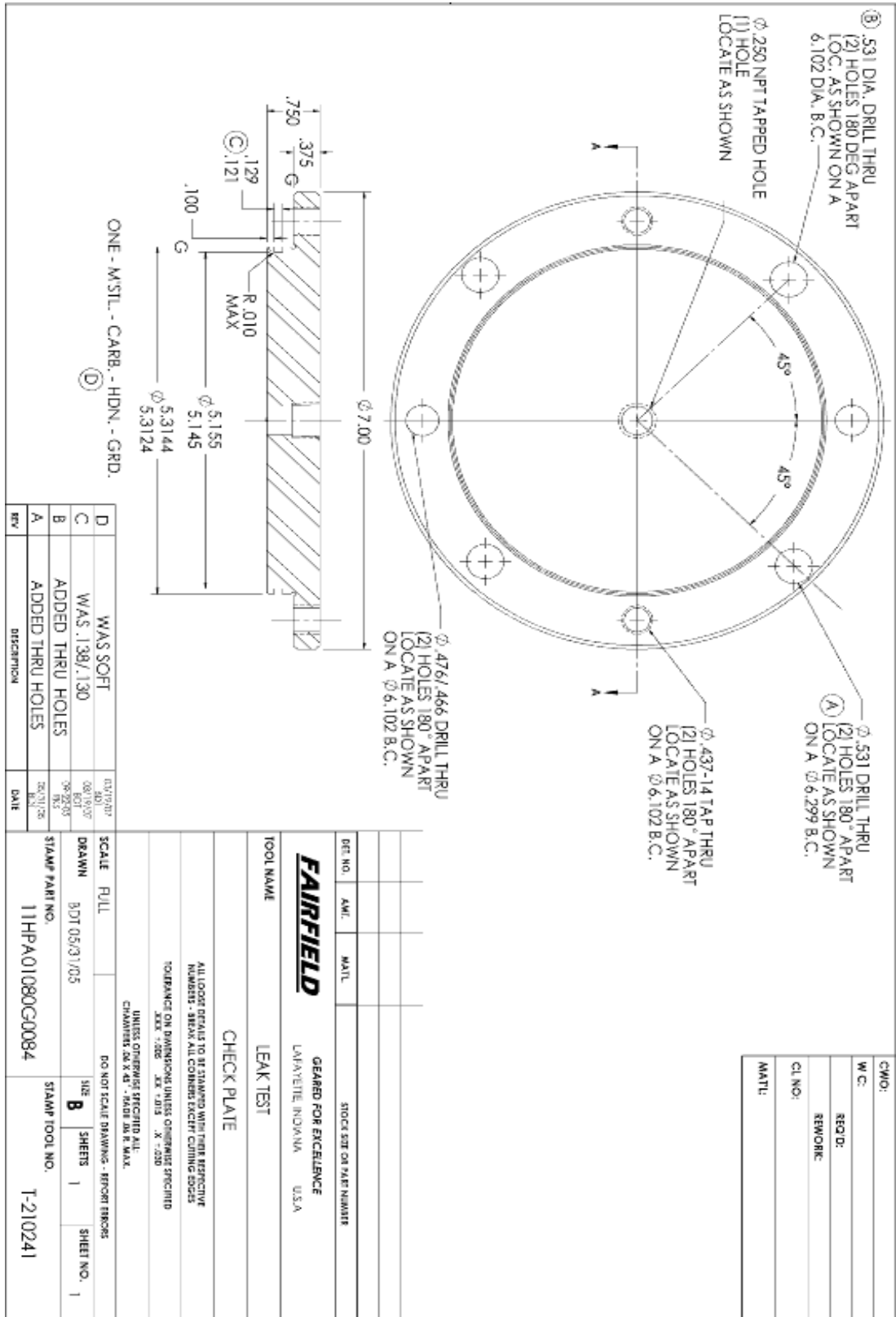
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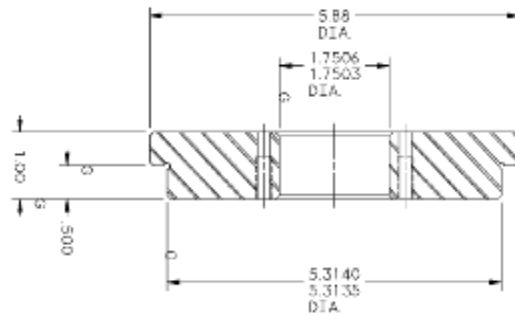
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ASSOCIATION

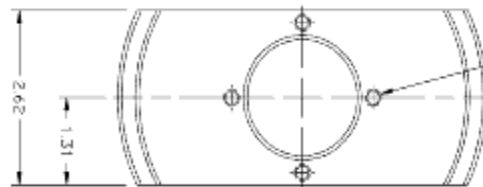
## T210241-LEAK CHECK TOOL



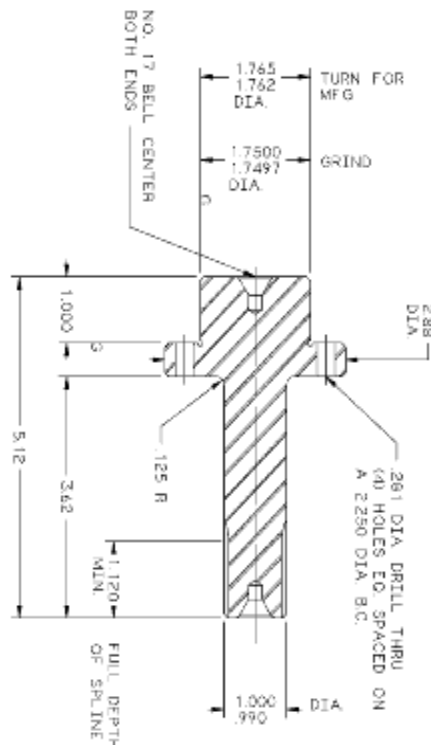
## T211706—BRAKE CHECK TOOL



250-20 TAP X .625 DEEP  
(4) HOLES EQ. SPACED ON  
A 2.250 DIA. B.C. }



⑩ ONE - M'STL. - CARBURIZE - HCN. - GRIND



⑩ ONE - M<sup>3</sup>STL - CARBURIZE - HDN - GRIND

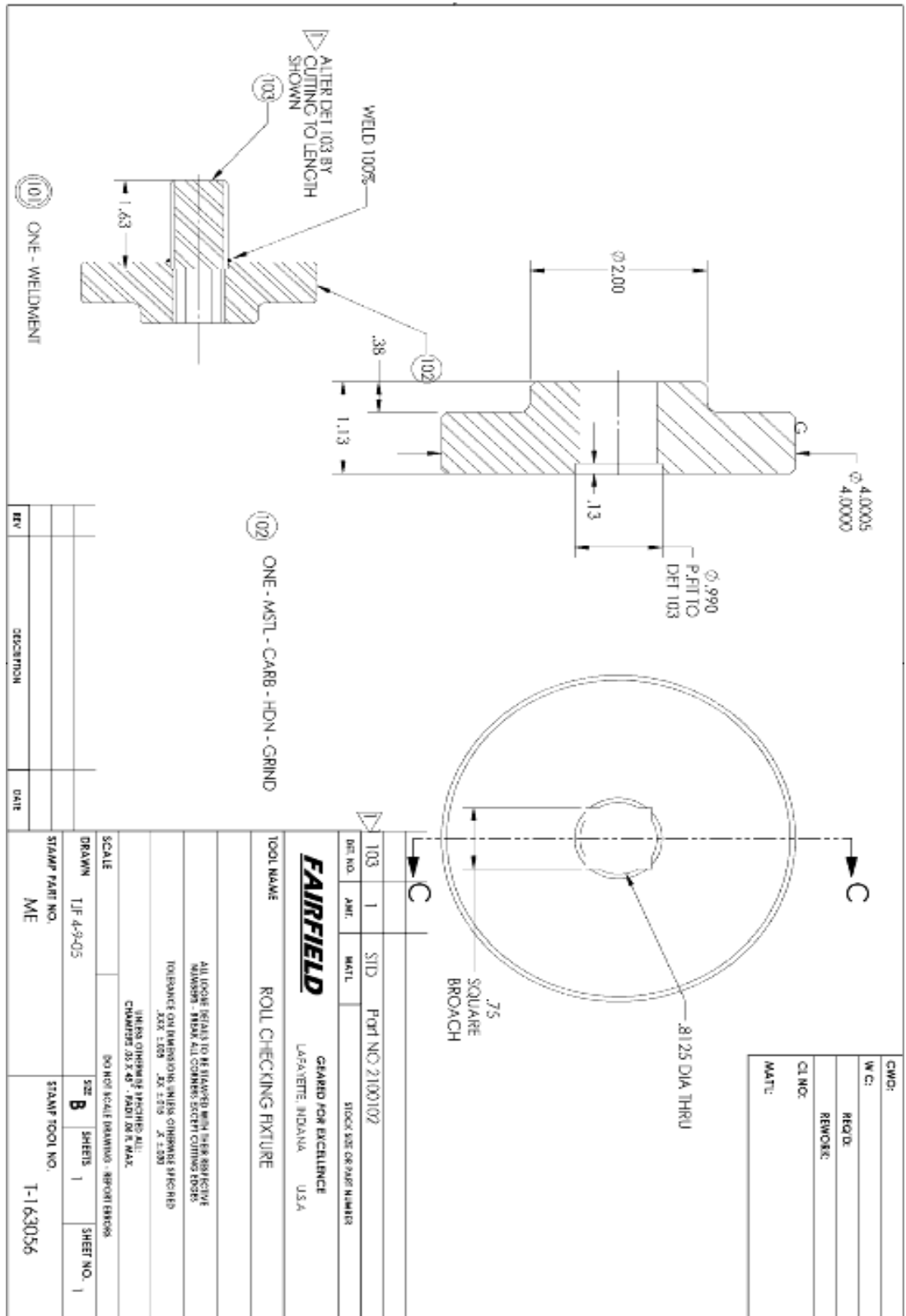
[illegible]

TOOLS REQUIRED  
T69132 D.C. DRIVING DOG  
T151116 D.C. DRIVING HEAD  
T61227 B.C. HEADSTOCK CENTER  
T84207 HOB

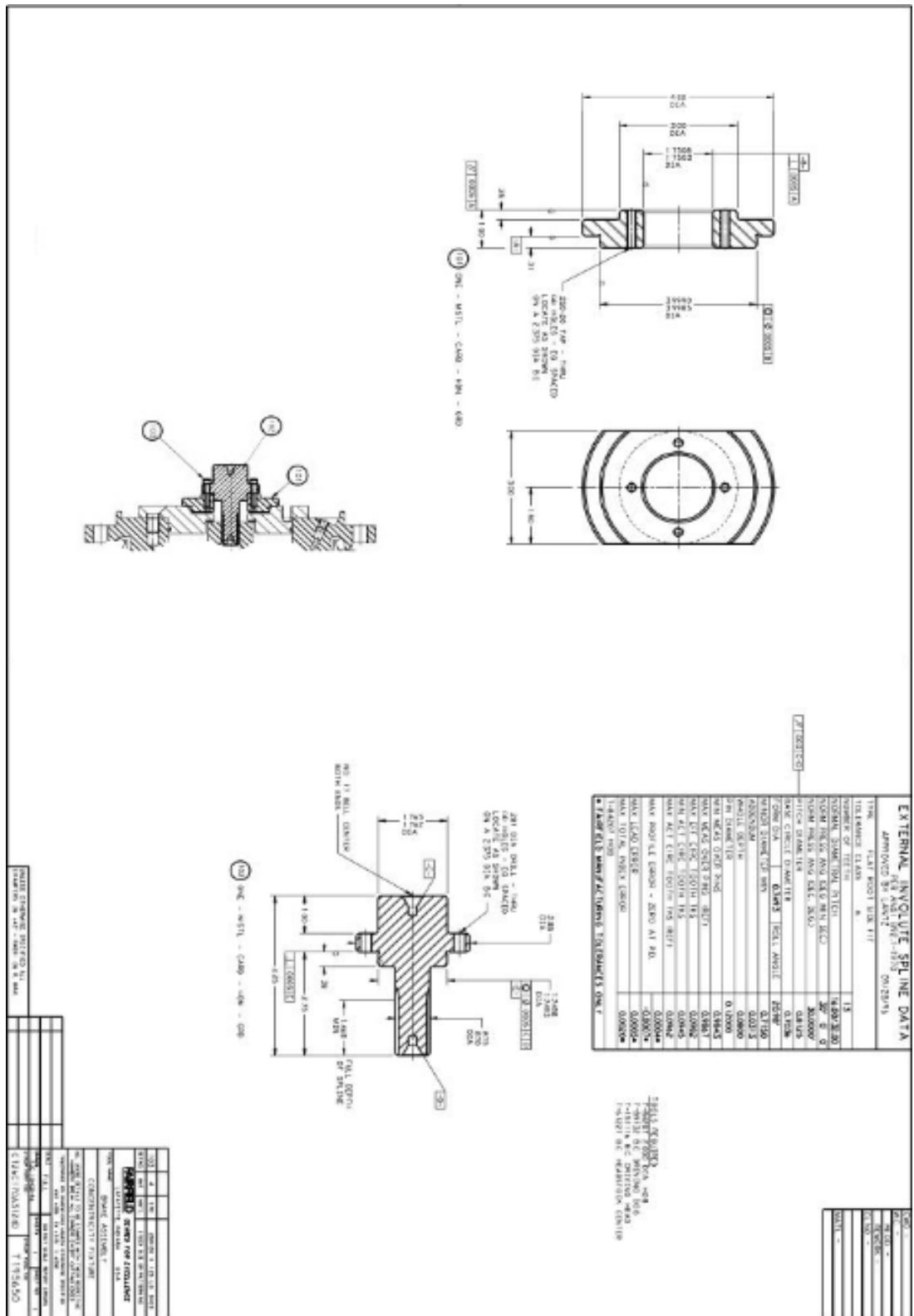
|         |
|---------|
| CWD -   |
| WC -    |
| FCWD -  |
| FCWDH - |
| CLAQ -  |
|         |
| MATC -  |

[illegible]

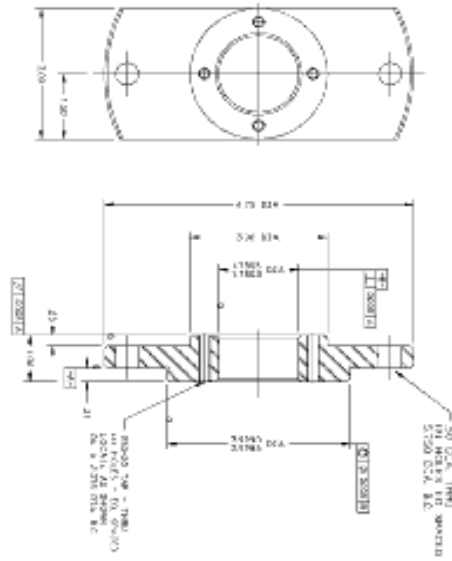
# T163056-ROLL CHECK TOOL



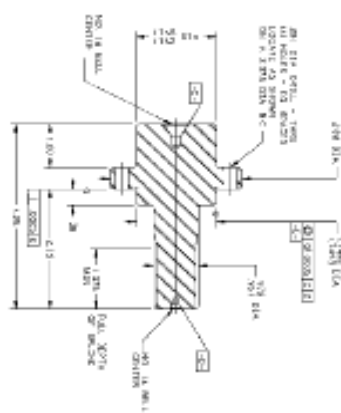




## T218542-BRAKE CHECK TOOL



(11) OMA - MBL - CARMMA - HNT - E-220



30-00000 - 1004 - 311000000 - 11.11 - 100 204

[illegible]

TROIA, PORTUGAL  
 1-1993-2000 (A 1993)  
 1-1993-2000 (B 1993)  
 1-1993-2000 (C 1993)  
 1-1993-2000 (D 1993)  
 1-1993-2000 (E 1993)

|          |
|----------|
| Case -   |
| W.C. -   |
| Field -  |
| Notes -  |
| T. No. - |
| W.C. -   |

[illegible]

[illegible]

## Planetary Final Drive Repair Instructions

### Contact Information

With more than 90 years of experience, Fairfield Manufacturing Co. Inc. has become the largest U.S. non-captive producer of gears, custom gear assemblies, planetary final drives and related gear products. Fairfield Manufacturing Co. Inc., headquartered in Lafayette, Indiana USA, is distinguished by our extensive design, manufacturing and applications engineering capabilities. Our 500,000 square foot plant is a modern, fully equipped manufacturing facility that includes a full service heat treat department.

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Lafayette IN 47903-7940

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#### Website

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